



CESA State RPS Policy Report

INCREASING COORDINATION AND UNIFORMITY AMONG STATE RENEWABLE PORTFOLIO STANDARDS

Prepared for Clean Energy States Alliance
and the
Northeast/Mid-Atlantic RPS Collaborative

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This report addresses how states can coordinate Renewable Portfolio Standard (RPS) implementation for greater success in building regional markets. It is based on the input and program experience of state RPS administrators, including administrators from the RPS programs in the Northeast and Mid-Atlantic region and members of Clean Energy States Alliance (CESA). CESA is a nonprofit coalition of state clean energy funds and programs working together to expand clean energy markets in the United States.

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EXECUTIVE SUMMARY

Every state renewable portfolio standard (RPS) is unique because each state has its own policy objectives, political context and constituencies. As a result, RPS policies vary in many ways, including such elements as eligibility, compliance mechanisms, resource categories, and program administration. For example, state policies differ as to resource eligibility, generator vintage, treatment of customer-sited generation, geographic eligibility, use of single or multiple tiers and the definition of those tiers, use of resource credit multipliers, compliance mechanisms, renewable energy certificate (REC) definitions, REC banking and borrowing, and cost caps, among other things.

It is the premise of this paper that harmonizing these differences among states may yield benefits—particularly in larger and more competitive markets for renewable energy credits or RECs—that provide cost savings for electric ratepayers. Therefore, the purpose of this analysis is to examine and evaluate mechanisms and approaches to increase harmonization and/or coordination among state RPS programs. It is hoped that the report will stimulate discussion and consideration of these concepts and the overall merits of greater state cooperation of RPS programs.

This report was undertaken on behalf of the Northeast and Mid-Atlantic RPS Collaborative. The Collaborative was established and guided by Clean Energy States Alliance (CESA) and Clean Energy Group (CEG) in 2006, with the goal of advancing interstate dialogue and cooperation regarding common RPS issues and challenges. A national State-Federal RPS Collaborative was also established in 2008 by CEG and CESA, expanding the geographic scope of the dialogue.

One of the objectives of the Northeast and Mid-Atlantic RPS Collaborative is to explore the relative merits of increasing harmonization across state RPS policies in the region. To that end, the Collaborative commissioned this report to provide an assessment of the advantages and disadvantages of greater state consistency in RPS policies and to examine the opportunities for increased state cooperation. The Collaborative members hope that this report will help to inform future multi-state discussions and actions aimed at building stronger renewable energy (RE) markets.

Harmonization can occur on a regional or on a broader, national basis. It may be most useful to focus initial harmonization efforts among states within an electricity trading market, or within areas covered by regional certificate tracking systems, because integrated electricity markets are also important to achieving cost-efficiency.

The stated goals of many RPS policies are to increase energy security, diversify the resource mix, stimulate economic development and improve environmental quality. The principle effect of harmonization, however, is to increase the economic efficiency of RPS markets. Because economic efficiency and reducing the cost of compliance is also important to policy-makers, the focus of this analysis is on harmonizing differences that affect market size, REC fungibility and the price of RECs, because these most directly affect the cost of RPS compliance.

The RPS design options shown in the left column of Table ES-1 appear to have the potential to affect the cost of compliance most directly. The column on the right shows a qualitative assessment of the impact of policy differences on the cost of RPS compliance related to the strength of regional markets. This impact assessment is subjective, based on the relative degree of the negative effect of the respective RPS policy difference on market size (volume of trading), market liquidity (number of sellers and buyers), REC fungibility, and price transparency.

In general, increased harmonization would help to overcome small state-by-state markets (an issue for some resources but not all), and would provide more options for selling the output from RE generators, simplify portfolio management for providers that serve load in more than one state, and lower costs to ratepayers and society.

Table ES-1. Assessment of Impacts

Eligibility	Impact Assessment
<ul style="list-style-type: none"> • Definition of resource eligibility, including multi-fuel facilities • Generator vintage requirements • Eligibility and definition of incremental renewable generation • Treatment of customer-sited facilities • Geographic area of generator eligibility and requirements for energy delivery to ISO 	<ul style="list-style-type: none"> • High • Medium • Low or medium • Low or medium • High
Structure	
<ul style="list-style-type: none"> • Single tiers or multiple tiers • Credit multipliers 	<ul style="list-style-type: none"> • Medium • Low
Administration	
<ul style="list-style-type: none"> • Compliance mechanism: RECs or no RECs • REC definition of environmental attributes • Flexibility mechanisms (REC banking, borrowing) • Cost caps and alternative compliance payments 	<ul style="list-style-type: none"> • Medium • Medium • Low • Medium or high

The paper then suggests options for how state RPS policies might be harmonized to a greater extent. Table ES-2 lists each option described and, for each, shows the qualitative estimated benefit to expanded and more liquid markets, and a qualitative assessment of the political difficulty of tackling and accomplishing the change in policy.

It is clear that there are many opportunities to increase harmonization among state RPS policies that will broaden RE markets. Those policy options that could have the strongest impact on creating larger, more competitive markets, however, tend to be politically difficult to accomplish because they would require legislative changes in policy and may run counter to individual state interests. There are relatively few policy coordination adjustments that would be easy to implement, and those that may be judged as easy tend to have less impact on creating larger markets, though they may offer other administrative benefits.

If states are interested in addressing RPS coordination options with potentially big effects, they might start by examining RPS eligibility criteria, geographic eligibility, or cost caps and alternative compliance payment (ACPs). On the other hand, if state leaders are inclined to start with easier steps first, they could consider standardizing measurement and verification (M&V) protocols for customer-sited generation, credit multipliers, or REC banking and borrowing rules.

Table ES-2. Assessment of Policy Change Options

Topic/Option	Description	Benefit to Markets	Political Difficulty
3.1	Eligibility: resource, vintage and incremental generation		
Option 1	Revise eligibility criteria	Medium	High
Option 2	Accept Class I generation eligible in another state	High	High
Option 3	Discount Class I generation from other states	Medium	High
3.2	Customer-sited facilities		
Option 1	Seek multi-state consensus on measurement and verification	Low	Low
3.3	Geographic eligibility		
Option 1	Broaden facility geographic eligibility	High	High
Option 2	Relax energy delivery requirements	High	High
Option 3	Use geographic eligibility as a flexibility mechanism	Medium	Medium
3.4	RPS structure		
Option 1	Standardize resource categories	Medium	High
3.5	Credit multipliers		
Option 1	Limit credit multipliers to in-state resources	Low	Low-Med.
Option 2	Standardize credit multipliers within market region	Low	Medium
3.6	Compliance mechanism: RECs or no RECs		
Option 1	Require greater REC price transparency	Medium	Low-Med.
Option 2	Encourage a common REC trading platform	Medium	Low-Med.
3.7	REC definitions		
Option 1	Define whether emission reduction attributes are required	Medium	Low
Option 2	Standardize to a model REC definition	High	Medium
3.8	Flexibility mechanisms (REC banking and borrowing)		
Option 1	Standardize banking and borrowing across states	Low	Medium
3.9	Cost caps and Alternative Compliance Payments (ACPs)		
Option 1	Standardize cost caps within market region	High	High

This analysis has been undertaken on the assumption that broader markets have economic value and are worth exploring. It is not intended to suggest that state policies that favor local generators are flawed or wrong. However, if states see value in harmonizing RPS policies, or are convinced that broader markets are important to the further development of renewable resources and lowering the cost of RPS imple-

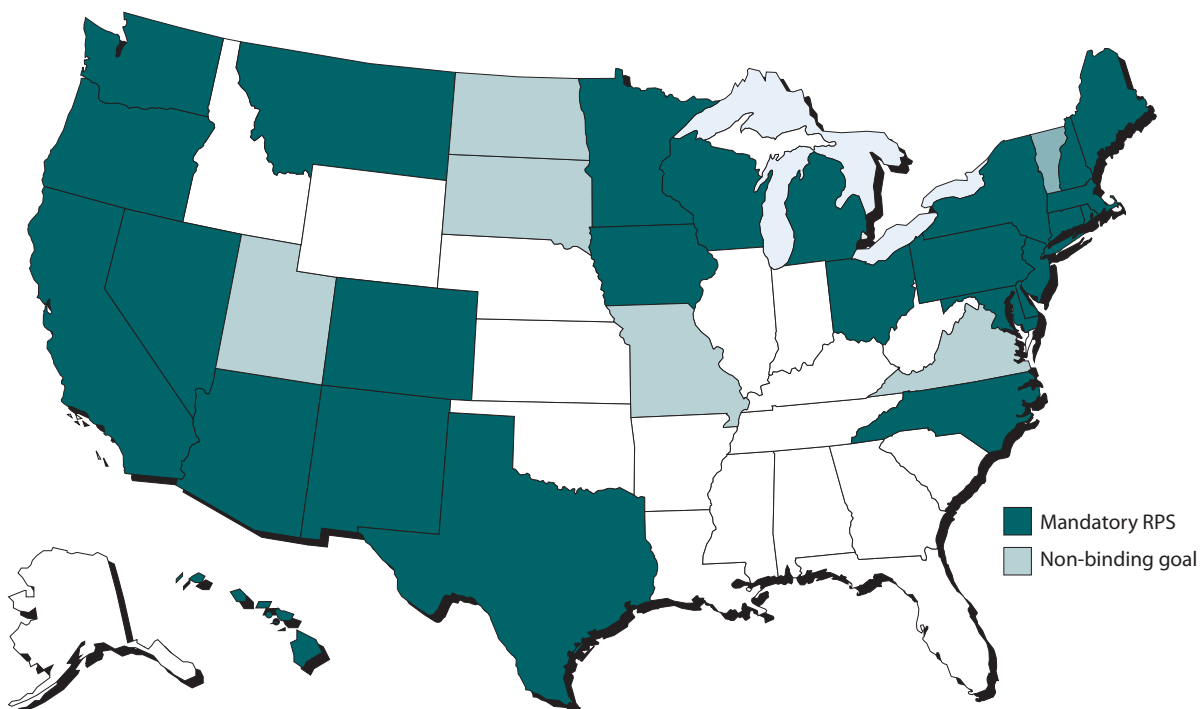
mentation, then the areas identified in Table ES-2 are where it makes the most sense to focus on seeking coordination.

It is also recommended that states considering the adoption of RPS laws, or developing RPS rules, carefully consider the effects of their policies on larger markets, with particular attention to the RPS policies of their neighbors in their electricity region. Attention to these regional RPS market details prior to RPS adoption could make a state's entry into RPS markets smoother and less costly.

1. INTRODUCTION

In 2006, Clean Energy Group (CEG) and Clean Energy States Alliance (CESA) established a multi-state collaborative of state RPS administrators in the Northeast and Mid-Atlantic states to advance interstate dialogue and cooperation regarding common RPS issues and challenges. The members of this Collaborative are listed in Appendix A. One of the initiative's objectives is to explore the relative merits of increasing coordination and harmonization across state RPS programs in the region. To that end, the Collaborative commissioned this report to provide an assessment of the advantages and disadvantages of advancing greater state consistency in RPS policies and to examine the opportunities for increased state cooperation. The Collaborative members hope that this report will help to inform future multi-state discussions and actions aimed at building stronger renewable energy (RE) markets.

Figure 1. States with RPS Policies and Non-Binding Renewable Energy Goals - October 2008



The Northeast and Mid-Atlantic regions have been early leaders in the use of the RPS as a mechanism to support RE projects. Today, 27 states and the District of Columbia have adopted a mandatory renewable portfolio standard (RPS). In the Northeast, the first states to adopt RPS policies were Maine and Massachusetts (1997), Connecticut and Pennsylvania (1998), and New Jersey (1999). The RPS programs were adopted as part of legislation restructuring electricity markets. Later, Maryland, New York and Rhode Island (2004) and Delaware and the District of Columbia (2005) adopted an RPS. New Hampshire adopted an RPS in 2007. Several of these states have updated their RPS policies since the first laws were enacted (Wiser and Barbose 2008).

Every RPS is unique, in either small or large ways, and therefore each state constitutes a mini-laboratory that is testing the effectiveness of individual policy elements. Because the RPS approach to encourage renewable resource development is still relatively new, and long-term results are yet to be known, there are real advantages to states experimenting with different policies. Variations also reflect differing state interests and goals. Finally, the diverse RPS experience will also prove valuable to designing an effective national RPS if the federal government eventually adopts such a program.

The variety of state approaches also can have disadvantages, however. To the extent that state policies and rules differ from each other, this can hinder the development of new RE projects in unexpected ways. For example, different definitions of eligible resources means that some generators can sell output for compliance in one state but not another. Different definitions of a renewable energy certificate can mean the difference between a limited number of potential buyers in a restricted market and a more robust number of potential buyers. More generally, different compliance mechanisms can distort the market by making some states more lucrative to sell into than others, while different eligibility rules for the geographic location of a RE generator may affect the liquidity of the RECs market and increase the aggregate cost of RE development.

1.1 Purpose of Report

This report examines how these state-by-state RPS differences may be eliminated or reduced—what is referred to here as “harmonization.” At a recent U.S. Department of Energy workshop on renewable energy certificate markets, it was suggested that a national dialogue on RPS harmonization is needed (Keystone and NREL 2007). This report contributes to that dialogue.

This analysis builds on earlier work by CESA (2005), which examined opportunities to advance the trading of renewable energy certificates for RPS compliance in northeastern states. That study provides a thorough review of the policies in each of the northeastern RPS states. A more recent study, prepared for CEG, updates RPS policies for the Northeast and Mid-Atlantic states (Exeter 2008). This study, in contrast, uses selective states to illustrate points rather than documenting each state policy in a comprehensive manner.

The purpose of this analysis is to examine and evaluate mechanisms and approaches to increase harmonization or coordination among state RPS programs. Examples are largely drawn from RPS policies in the Northeast and Mid-Atlantic region, but could be applied nationally.

It is clear that harmonization is not easy because each state is independent, with its own energy needs, policy objectives and constituencies. By identifying opportunities for harmonization, the report's intent is to stimulate discussion and consideration of the value of larger markets. While predictability and stability in RPS program design is important to all stakeholders, from time to time each state considers revisions and re-authorizations of its RPS, either legislatively or administratively. These program reviews provide the states with opportunities to make smart changes in RPS design and to advance interstate cooperation.

This analysis has been undertaken on the assumption that broader renewable energy and REC markets have economic value and are worth exploring, but it is not intended to suggest that state policies that favor local markets are flawed or wrong. Instead, if states see value in harmonizing RPS policies, or are convinced that broader markets are important to the further development of RE resources, then these are the areas where it may make the most sense to focus and seek coordination.

Before examining opportunities to harmonize RPS policies, however, it is important to identify both the pros and the cons to such harmonization.

1.2 Advantages of Harmonization

RPS harmonization and broader markets for renewables can offer a number of advantages:

- Resource development in harmonized markets is more cost-efficient than in markets with greater RPS policy differences. In fact, the main idea behind harmonizing RPS systems is to exploit cost differences across states (Sölderholm 2008).
- RPS harmonization can lead to broader markets, with more buyers and sellers able to make transactions for either electricity or renewable energy certificates (RECs). RE generators have more opportunities to sell their products because more buyers have access to them, reducing the political risk associated with changes to the legislation or rules of any single state's RPS.
- If the RE commodity is fungible, meaning it is identical in specifications, more buyers and sellers create more competition and should lead to lower overall ratepayer costs.¹
- Lower prices are beneficial to the obligated entities that must comply with the RPS—the utilities, energy service providers or load-serving entities (LSEs)—and these lower costs redound to the consumers or ratepayers that ultimately pay for the cost of compliance.
- With a greater volume of trading, broader markets may lead to better price disclosure through price indices and forward price curves. The latter are especially important to financial investment decisions regarding new RE projects.
- One goal of a number of RPS programs is to reduce climate change by increasing the number of non-carbon-emitting generation sources, as the greenhouse effect knows no boundaries. In fact, it may be cheaper to reduce greenhouse gas emissions by supporting new RE generators in another jurisdiction where the resource is more cost-effective than it is to do so closer to home.

- RPS rules that limit resource eligibility to certain states may be a violation of the interstate commerce clause prohibiting states from erecting barriers to trade.
- For LSEs that serve multiple states, increased harmonization may reduce administrative costs and complexities associated with the RPS. The same is true for renewable energy developers that serve multiple state RPS programs.

1.3 Disadvantages of Harmonization

In contrast, there are several potential disadvantages to harmonization. Harmonization and resulting broader markets means that projects can be sited farther away from the state responsible for the RPS policy. More remote development can reduce in-state benefits in several ways:

- Harmonization may reduce the ability of states to develop tailored RPS policies that respond to state-specific policy goals, interests, and stakeholders.
- Harmonizing state policies by broadening the location of new RE generation eligible to satisfy the RPS may undermine the goal of encouraging in-state economic development.
- To the extent that harmonization reduces in-state development of RE resources, it may also reduce local environmental benefits from the decrease of SO₂, NO_x, mercury and particulate emissions.
- In-state development of new RE resources generally has a positive benefit in terms of public education about renewable energy. This can lead towards greater acceptance of siting new projects (e.g., siting new wind projects in western Pennsylvania helped create support for new wind and other renewable development). This benefit could be lost if harmonization leads to development in more distant states.
- Increased competition may reduce the price that RE generators can obtain for their products, given the loss of a protected market, thereby reducing renewable energy development in locations with low-moderate renewable resource potential and leading to more concentrated RE development.
- Harmonization may reduce the degree to which experimentations with alternative RPS policy designs is occurring at the state level, and thereby limit the extent to which wide-ranging experiences are producing lessons learned for future RPS design.
- The changes to RPS legislation and rules envisioned through harmonization may—in the near term—de-stabilize RE markets as developers and LSEs are uncertain about the ultimate design of the RPS, and investments plans by both developers and LSE made under the previous RPS rules may need to be re-visited.

It should be noted that increasing harmonization can occur on a regional or on a broader, more national basis, with the size of the resulting market dependent on the geographic scope of harmonization. In the case of harmonization in a region, such as the Northeast, many of the “local benefits” discussed above—education, environmental, and development—will still result, with no significant disadvantage resulting from a regional perspective.

1.4 Outline of Report

Section 2 of this paper identifies RPS-related market barriers with a discussion of their effects on broader markets. Section 3 then suggests opportunities for increased interstate cooperation and harmonization, with an assessment of each option. Finally, Section 4 presents conclusions and recommendations for pursuing more fluid and effective regional and national REC markets.

2. RPS POLICY VARIATIONS AFFECTING MARKETS

RPS policies can vary in many ways. Several variations in RPS program design, as identified by Wiser et al. (2007), are shown in Table 1. CESA (2005) also identifies certificate tracking systems as a variation to consider; this is included in “compliance verification” listed in Table 1.

Table 1. RPS Policy Design Options

Structure, Size, and Application	Eligibility	Administration
<ul style="list-style-type: none"> • Basis (energy vs. capacity obligation) • Purchase obligations over time • Structure (single tier or multiple tiers) • Resource diversity requirements or incentives • Start date • Duration of obligation (sunset provisions) • Application to retail suppliers, and exemptions from obligation • Product- or company-based application 	<ul style="list-style-type: none"> • Geographic eligibility • Resource eligibility • Eligibility of existing renewable generation • Definition of new/incremental generation • Treatment of multi-fuel facilities • Treatment of off-grid and customer-sited facilities 	<ul style="list-style-type: none"> • Regulatory oversight body(ies) • Compliance verification (RECs, or otherwise) • Certification of eligible generators • Compliance filing requirements • Enforcement mechanisms • Cost caps and alternative compliance payments (ACPs) • Flexibility mechanisms (banking, borrowing, etc.) • Contracting standards for regulated retail suppliers • Cost recovery for regulated retail suppliers • Interactions with other energy and environmental policies

Not all of these policy variations directly affect the functioning or strength of RE market development. For example, most of the structure, size and application options listed in the first column of Table 1 would not affect the operation of larger markets or the fungibility of RECs. Certain aspects of the administration options listed in the third column—such as the regulatory oversight body, enforcement mechanisms, cost recovery rules, and most of the compliance filing requirements—also would not affect market operation. These are individual state choices that, even if different in every state, do not impede the operation of a common market for RECs.

On the other hand, all differences in RE resource and generator eligibility directly affect market function because they can expand or constrain the number of interested buyers and sellers in the market. Markets can function with some differences from state to state. However, if a hydropower project with a capacity of 30 MW is eligible in one state but not another, the market is diminished for that particular generator. Similarly, if generators that began operation after 1998 are eligible in one state but another state only allows generators that began operation after 2002, then again the market is diminished.

These policy variations have been screened as to their potential effect on broader markets using the following criteria:

- Will the design option affect the number of market participants?
- Will the design option affect the fungibility of RECs?
- Will the design option affect the price of RECs?

Using these criteria, the RPS design options shown in Table 2 appear to have the greatest potential to affect broader markets for renewables.

Table 2. Design Options Affecting Broader Markets

Eligibility	Structure	Administration
<ul style="list-style-type: none"> • Definition of resource eligibility, including multi-fuel facilities • Generator vintage requirements • Eligibility and definition of incremental renewable generation • Treatment of customer-sited facilities • Geographic area of generator eligibility • Requirements for energy delivery to ISO 	<ul style="list-style-type: none"> • Single tier or multiple tiers • Resource diversity requirements or incentives (credit multipliers) 	<ul style="list-style-type: none"> • Compliance mechanism: RECs or no RECs • REC definition of environmental attributes • Flexibility mechanisms (REC banking, borrowing) • Cost caps and alternative compliance payments

There also are several areas where RPS administration and compliance might benefit from increased coordination and harmonization but which would not have much effect on enlarging markets or increasing competition in RPS markets. Examples include a state’s approach to certifying eligible generators, compliance periods, and contracting standards. These are described now only briefly as the primary focus of this report is to describe those measures that could significantly affect market size, REC fungibility, or the price of renewable energy or RECs.

Certification of Eligible Generators

As part of RPS rules, each state must determine whether a particular RE generator meets its eligibility criteria. A generator in Maine, for example, must apply for eligibility in Maine, Massachusetts, New Hampshire, Connecticut and Rhode Island if it wants to be able to sell its certificates for compliance in each of those states, and each state must separately make an administrative determination of eligibility. This is necessary

because each state has somewhat different eligibility criteria. To reduce this duplication of certification effort, states could jointly assign to or contract with a single institution that does all certification in the region. Alternatively, states could agree to assign responsibility for certification to the state in which the generator is located, even if eligibility criteria differ. Of course, if the eligibility criteria were harmonized, it would be easier for state regulators or RPS program administrators to rely on their counterparts to certify the generators in their state.

Compliance Periods

Each state has established annual compliance periods for meeting RPS targets, but states define the year differently. For example, Delaware, New Jersey and Pennsylvania have a compliance year that begins June 1, while the compliance year for Maryland and the District of Columbia begins and ends with the calendar year. The date by which obligated entities must file their reports also varies from state to state. Harmonizing the compliance year and reporting date, at least within a region, would simplify the administrative burden on providers serving loads in multiple jurisdictions, and more importantly, would make it easier for market participants to determine if the market is “long” or “short” for a particular period.

Contracting Standards

A number of states require long-term contracts as part of their RPS. Such requirements may be technology-specific, such as Maryland’s requirement of 15-year contracts for solar, or they may be limited in scale, such as Connecticut’s requirement of long-term contracts for 150 MW. New York, through its central procurement agency NYSEERDA, enters long-term contracts for RPS attributes, and Massachusetts electric distribution companies are encouraged, with financial incentives, to enter into contracts of 10 to 15 years for renewable energy or RECs beginning July 1, 2009 and continuing for five years. At the same time, it should be acknowledged that often such contracting requirements apply only to in-state RE resources, effectively boxing out-of-state RE generators out of the market.

Contracting standards provide support for financing new RE projects, and long-term commitments can help reduce uncertainty and build stronger forward price curves for RECs (Keystone and NREL 2007). Requiring long-term contracts can be difficult, however, in states that have restructured electricity markets because competitive providers, unlike regulated utilities, have uncertain loads and may not be sufficiently credit-worthy. In addition, providers of last resort face the risk of load attrition. Contracting requirements and consequent support for RE project finance may stabilize rates and increase the number of suppliers, improving market liquidity, but long-term contracting may also restrict short-term trading in RECs and thereby reduce market liquidity.

Harmonizing of contracting standards among states to a uniform requirement may not be critical to ensure broader market functioning; what works in a regulated market may not be easily transferable to a restructured market. However, states could share their experiences, and lessons learned could be evaluated for identification of a best practice to be considered by states.

2.1 State variations on selected design options and potential market barriers

2.1.1 Definition of resource eligibility

In most states, renewable resource eligibility extends to solar, wind, geothermal, biomass, hydropower and ocean energy resources. Some states do not include geothermal or ocean energy resources because these are not indigenous or are not cost-effective with the RE resources available in state.

Specific RE categories, especially hydropower and biomass, often are defined with great variation among states. These definitional differences are established either by statute, by regulation, and/or by a combination of statute elaborated on in regulatory rules.

The treatment of hydropower eligibility is particularly varied and leads to extremely balkanized RPS markets for hydropower projects.

For example, in New England, Maine allows hydropower of 100 MW capacity or less, while Rhode Island allows hydropower with an aggregate capacity of 30 MW or less, and to be eligible as “new” it must not involve “any new impoundment or diversion of water with an average salinity of twenty (20) parts per thousand or less.” New Hampshire Class IV sources include hydropower facilities with a capacity of 5 MW or less that “have installed FERC-required and approved upstream and downstream diadromous fish passages and, when required, have met state water quality certification...”

Connecticut defines hydropower as a run-of-the-river facility with a capacity of 5 MW or less that does not cause an appreciable change in the river flow, while Massachusetts allows new and incremental hydropower up to 25 MW as a Class I resource.

Biomass definitions also vary significantly across states: New Jersey and Maryland provide detailed lists of the different qualifying fuel types, and in the case of New Jersey, requires a biomass sustainability determination by the NJ Department of Environmental Protection. In those states that do list the eligible biomass fuel sources, no two fuel lists are the same.

Delaware uses a more concise, statutory definition: “Electricity generated from the combustion of biomass that has been cultivated and harvested in a sustainable manner as determined by DNREC, and is not combusted to produce energy in a waste to energy facility or in an incinerator, as that term is defined in Title 7.”

These differences in the definitions of eligible resources illustrate how widely eligibility can vary. How these differences affect markets and market participants is illustrated here in the case of hydropower and biomass.

For hydropower, a 35 MW hydropower generator eligible in Maine is not eligible in Rhode Island, New Hampshire or Connecticut. A 15 MW hydropower facility eligible in Rhode Island is not eligible in New Hampshire or Connecticut. A 3 MW hydropower facility eligible in New Hampshire may or may not be eligible in Connecticut, depending on whether it is run-of river with no appreciable change in river flow.

If the facility qualifies in Connecticut, it will probably qualify in any of the other New England states, but if it qualifies in Maine, there is a good chance it will not qualify elsewhere in New England. The larger facilities have a smaller market. Their certificates will not be accepted for compliance in other states, consequently there is less demand for their certificates and their certificate prices will be lower. Each certificate must include information about which states will accept it for compliance, and buyers must be careful to ensure that the certificates they purchase are eligible in the state where they need certificates for compliance.

Biomass eligibility presents an even trickier hurdle because eligibility may depend on the content of the fuel input and how the resource is managed—it is not just a matter of the nameplate capacity or other objective criteria such as whether water is impounded or fish passage is enabled. As with hydropower, biomass facilities that qualify in only one or two states but not others face smaller markets, lower demand and lower prices. Certificates from different biomass facilities are not interchangeable unless they have been independently certified by each state according to that state's criteria.

It should be noted that the Northeast and Mid-Atlantic RPS Collaborative has taken a step towards advancing harmonization of RPS resource definitions. The Collaborative has developed some standard resource eligibility definitions for consideration by states. Appendix B details the model resource definitions.

It is clear that increased harmonization of resource eligibility definitions would help overcome small state-by-state markets (an issue for some resources but not all), which would provide more options for selling the output from RE generators, simplify portfolio management for providers that serve load in more than one state, and lower costs to ratepayers and society.

2.1.2 Generator vintage requirements

A number of states include a requirement that eligible RE generators began operation on or after a specified date. This type of vintage requirement is generally intended to support newer facilities that are still amortizing costs, or to stimulate the development of new capacity. However, states with such vintage requirements usually choose different dates to define eligibility.

For example, Massachusetts defines qualifying new RE resources as systems installed after December 31, 1997 (with an exception). New York requires eligible facilities to have begun operation on or after January 1, 2003. Maine Class I facilities must have begun commercial operation on or after September 1, 2005. New Hampshire new resources for Class I and II must have begun operation after January 1, 2006.

Vintage eligibility definitions may be a function of the state's policy goals (i.e., focus on stimulating new resource development), the date when the RPS was adopted, whether the state has a significant amount of renewable generation in operation prior to the adoption of the RPS (i.e., a desire to support existing resources), or another key date in legislative or renewables policy history.

Such a variety of vintage eligibility definitions, however, can make it difficult for a particular facility to qualify in multiple states unless it began operation quite recently. A facility that began operation in 2002, for example, will be eligible in Massachusetts but not in New York, and although it may be eligible for Class II in Maine (which has no vintage requirement) or Classes III and IV in New Hampshire (allowing certain existing biomass projects or small hydropower that commenced operation prior to January 1, 2006), its available market is smaller. Even if the facility conforms to several state resource eligibility definitions, it may find its market constrained by the vintage eligibility requirement.

Different vintage requirements also mean that obligated entities have to manage their portfolios more closely, making sure that the RECs they buy meet the vintage requirements as well as the resource requirements. To the extent that this constrains market size, it means higher compliance costs passed on to ratepayers and society.

2.1.3 Incremental renewable generation

In some states, incremental power production at an existing RE facility may qualify as new renewable energy if certain conditions are met. In Maine, for example, incremental generation resulting from capacity added to an existing facility after September 1, 2005 is eligible for the Class I RPS. New Hampshire allows incremental new production (meaning the difference between the annual calendar year output and its historical generation baseline) to count towards its Class I requirement if the incremental new production is directly attributable to capital investments made after January 1, 2006. (This is distinct from repowered existing biomass or hydropower facilities that add to existing capacity, which is also eligible.) Massachusetts allows the incremental output that is greater than the average generation rate from 1995 to 1997 to count as new generation under its “vintage waiver” provision.² Other states have different definitions for eligible incremental generation, while some states do not acknowledge the issue at all, suggesting that incremental output is not eligible.

These examples illustrate that facility eligibility can depend on meeting a combination of criteria, including resource type, generator vintage and incremental generation. When layering resource type, vintage and incremental generation requirements, those RE generators eligible on all counts have access to a very small market, probably in a single state.

2.1.4 Customer-sited facilities

Grid-connected customer-sited generation is eligible for the RPS in most states.³ In fact, several states, including (but not limited to) Delaware, Maryland, New Hampshire, New Jersey, New York and Pennsylvania, have adopted special tiers or set-asides for solar (often customer-sited) or more generally distributed generation. The presence of a set-aside target for these systems may affect market size and liquidity (see discussion of market structure in Section 2.1.6), but here the focus is on the differences in measurement and verification (M&V) of the output from such facilities, and to geographic eligibility for these facilities, and how the geographic eligibility for these facilities is treated.

Measurement and verification of customer-sited generation varies from state to state. For example:

- Because it offers performance incentives for customer-sited systems, New York requires monitoring and data acquisition from on-site sensors and meters approved by NYSERDA to confirm the amount of energy production.
- For net metered systems, Pennsylvania requires that customer-generators who want to claim the RECs must install additional metering at their own expense. If the utility is to receive the certificates, then it must pay for the additional metering.
- Delaware and Maryland do not specify measurement and verification, but rather leave it to the tracking system rules to govern whether certificates will be issued. In that case, the Generation Attribute Tracking System (GATS) requires a revenue quality meter to be read on a month-end basis.
- New Jersey requires “periodic” meter readings, but for solar PV systems with a capacity of less than 10 kW, annual engineering estimates or monitoring protocols may be accepted.

If these customer-sited generators are only eligible for in-state certificate use, then the different approaches to measurement and verification do not affect markets significantly—except the extent that system designers, installers and REC aggregators that work in a multi-state region would find it easier to conform to a common set of rules. On the other hand, if one state accepts customer-sited certificates from another state, then the market is limited if the customer-generator has complied with the M&V rules of its home state but not with the rules of the neighboring state.

2.1.5 Geographic eligibility and energy delivery requirements

In addition to resource type and vintage eligibility requirements, most RPS states require that energy be delivered to a specified state or region. In the Northeast, RPS states generally require that eligible systems be located within the region (either NEPOOL, New York, or PJM), or that energy from eligible systems be delivered into the region. In Pennsylvania, an eligible generator must be located in one of two control areas (PJM and Midwest ISO) serving the state, and MISO-located generators are eligible only to meet the RPS of those utilities served by MISO. Both of these control areas are large, however, so Pennsylvania can draw upon eligible generators located in a number of other states.

Connecticut, Massachusetts, New Hampshire and Rhode Island, all of which are served by a single control area (ISO-New England) allow eligible generators if they are located in a control area adjacent to ISO-New England, as long as those generators deliver electricity into ISO-New England.⁴ Delaware, Maine, Maryland and New Jersey allow eligible generators to be located anywhere (not restricted to an adjacent control area) as long as energy is delivered to their regional control area. The District of Columbia is the only jurisdiction in the Northeast that allows unbundled RECs (without electricity delivery) from generators located in states that are adjacent to the PJM Interconnection.

Looking outside the Northeast, several states encourage in-state generation for complying with their RPS, but do not require specific geographic locations. For example:

- Colorado has no restriction on generator location but provides credit multipliers for in-state projects.⁵

- Illinois requires in-state resources unless insufficient cost-effective resources are available. In that case, the procurement agency may purchase from adjoining states, and if still there are insufficient cost-effective resources, they may be procured from other regions. After 2011, however, equal preference may be given to in-state and adjoining states.
- North Carolina allows up to 25% of compliance with the RPS to be met with unbundled RECs from outside the state (and one load serving entity is granted no such limit), but the remainder must be from facilities located in-state or from facilities that deliver energy into the state.

Customer-sited RE systems may be subject to further geographic restrictions. These systems are sometimes required to be located within the state, as in New Hampshire. This tends to be the case if the state has a separate RPS tier that focuses on customer-sited solar or distributed generation, and is certainly true if the state provides incentives for the installation of customer-sited generation.

In contrast, New Jersey requires that the generator be interconnected with a New Jersey electric distribution system to qualify for issuance of a Solar REC (SREC), but rules state that the Board of Public Utilities may waive this requirement if it adopts a regional tracking system for SRECs. Delaware merely requires that SRECs be created and supplied by PJM-EIS GATS, suggesting that solar generators may be located outside Delaware, but the state will give a credit multiplier towards RPS compliance if the eligible customer-sited generation is located in-state and installed prior to 2015.

These varying geographic restrictions have multiple effects on markets. Narrower geographic restrictions provide support to local generation and ensure primarily local economic and environmental benefits. A more expansive requirement for energy delivery to a broader regional control area ensures that generation within the region is displaced, and to the extent that polluting fossil-fired generators are displaced, it will improve air quality both locally and in the broader region and contribute to regional development. No requirement for energy delivery would provide a lower cost of compliance, because RECs could be sourced from a much wider area, but would provide no certainty of local or even regional economic and environmental benefits.

It is clear that limiting the location of eligible RE generators to certain geographic areas places constraints on the size of the market. Where the eligible region is large, this may not have a significant effect. However, even in a geographically large area, the constraints may have a downside on cost of compliance and market liquidity if the cumulative RPS demand in states within the region is high relative to available supply.

Another related factor that can hinder broader RE facility markets is the requirement for energy delivery.⁶ Where energy delivery is required to a state or region, it usually follows the applicable rules of the respective Independent System Operators (ISOs). In general, ISOs require any generators importing energy into their system to schedule generation for each hour in day-ahead or real-time markets, and to meet those schedules as closely as possible. This is necessary for grid operators to control the system and match supply with demand. So when a state RPS program requires energy delivery to an ISO, even without

mentioning hourly matching, hourly matching is often a *de facto* result unless the state specifies otherwise.

Certificate tracking systems sometimes hardwire this requirement into their operating rules, which may require evidence of a transmission reservation, a NERC (North American Electric Reliability) tag, proof of generation, and settling the energy in the importing ISO.

The effect of these specific energy delivery requirements is particularly challenging for intermittent resources such as wind and utility-scale solar that are more difficult to schedule. The Generation Information System (GIS), for example, will issue certificates (for imports) that are the lesser of scheduled energy delivery and the actual delivery. If a wind generator produces less than scheduled, it (or the importer) will receive certificates equal to actual generation delivered; if the generator produces more than scheduled, however, it will only receive certificates equal to the scheduled delivery.

Beyond RPS markets, tracking system rules that hardwire RPS policy (or ISO scheduling rules) requiring energy delivery ignore the needs of voluntary REC markets. These markets rely to a large extent on unbundled RECs that are purchased without energy. As such, voluntary markets are wide-ranging—even national—markets, but purchasers cannot always rely on their regional tracking system to record and verify their REC purchases if the RECs were issued by a tracking system far away, or if their REC purchases were from an adjacent control area but lack an accompanying energy delivery.

While geographic limitations and delivery requirements have an obvious impact on generators, they also affect the number of market participants and market size, which translates into higher compliance costs for obligated entities, ratepayers and society.

2.1.6 RPS structure

Many RPS policies establish different classes or tiers of eligible RE resources with tier-specific targets required. For example, some differentiate between “existing” and “new” eligible resources (those built before or after a specific date), or between specific resource types such a solar or less demonstrably RE resources. These separate categories are base on specific public policy objectives—to encourage the development of new solar, for example, or to provide support to existing generators.

The effect of these different categories, however, is to segment the market. Some states have as many as four different classes of eligible resources; each class stands alone as a separate requirement.

Although the tiered structure of many RPS designs does not affect the number of obligated entities or buyers in the market, there are fewer generators that fit each category. As a result, markets are smaller and there is less competition, especially if the tiers do not align among the states in a market region. However, if instead states could standardize tiers and the types of resources within each, some market balkanization could be averted. States could still decide which tiers they want to support.

The different tier and resource categories have a negative effect on REC fungibility also. Although in some cases “new” resources may be used to satisfy a second tier of “existing” resources, in general certificates are not interchangeable between resource categories.

Because each class establishes its own market, there are fewer market participants, and because REC fungibility is limited, there may be less trading in each category. Both of these factors can affect both the price level and reduce price transparency. Price levels themselves will be different—not necessarily in one particular direction—because supply and demand are different within each category. This market segmentation also means that load serving entities must manage their resource portfolios more closely—the more categories, the more sub-portfolios they must manage to compliance standards.

2.1.7 Credit multipliers

Some states offer credit multipliers that magnify the value of RECs from specific resource types. For example, Delaware offers a 300% credit for each MWh or REC generated by customer-sited photovoltaic systems located in the state, and by fuel cells powered by renewable fuels, both of which must be installed before 2015; Delaware also offers a 150% credit for wind energy generated by an installation sited in Delaware before 2013. Until December 31, 2008, Maryland offers 120% credit for wind, and 110% credit for methane from a landfill or wastewater treatment plant. Until December 31, 2009, the District of Columbia offers 110% credit for wind and solar, and until December 31, 2010 it offers 110% credit for methane from a landfill or wastewater treatment plant.

The interaction of credit multipliers with markets can be complex and depends on other RPS rules as well as the supply-demand balance. The multiplier itself is intended to stimulate additional supply, or to accelerate supply for certain resources, and if successful it could have the effect of pumping more RECs into the market, which would tend to lower the price overall for a resource favored by a multiplier. However, the efficacy of the policy is not in question here, only the effect of the differences among states on markets.

One effect of some states offering credit multipliers while other states do not, or of states offering different multipliers, is to lower regional demand for eligible resources in the class where the extra credit is offered. Assuming the states being compared are in the same REC market region, such that the actual supply is unchanged, the multiplier reduces the actual RECs that must be purchased for compliance in the region.

It might be thought that obligated entities would pay more for RECs that are eligible for a credit multiplier. However, as long as the obligated entities in states with a multiplier face the same price as everyone else in the region, it is unlikely that RECs would gravitate towards the states with the multipliers unless demand exceeds supply in the region. In that case, for example, if a state with an alternative compliance payment (ACP) of \$50/MWh offers a 200% credit multiplier, then the obligated entity in that state would be willing to pay up to \$100 for that REC. Thus, in a supply limited market, the obligated entity should be willing to pay more than an entity in a different state with the same ACP but no credit multiplier. But if the ACP in the state with the credit multiplier is \$25/MWh, then the obligated entity would be willing to pay up to \$50, the same as a state with a \$50 ACP but no multiplier, with no resulting market distortion.

Further, if credit multipliers are restricted to in-state generation, as they sometimes are, then the credit multiplier would have little effect because cross-state trade in RECs from such facilities is already limited—those RECs are going to stay home.

In summary, the presence of credit multipliers in some states and not others will not affect the number of market participants and will not affect the fungibility of RECs, but it could distort the price of RECs in a region where supply is short.

2.1.8 Compliance mechanism: RECs or no RECs

States rely on the acquisition of RECs and/or the purchase of renewable electricity for compliance with their RPS. A few states allow only the purchase of electricity bundled with attributes (or RECs), while most states allow either for compliance. In many states, RECs issued and tracked by the regional tracking system are required for compliance (Holt and Wiser 2007). This is true for example in Delaware, New Jersey and Pennsylvania. This is also true for the New England states except that Maine allows either RECs from the NEPOOL GIS or renewable electricity not tracked by the GIS but purchased in that part of the state not served by the GIS.

New York is different from other states because of its “central procurement” approach to RPS compliance. The New York RPS is satisfied by procurement of “RPS attributes” by the New York Energy Research and Development Authority (NYSERDA). Although RPS attributes are the functional equivalent of unbundled RECs, the state does not formally recognize RECs at this time.

Looking outside the Northeast, states such as Arizona that require attributes bundled with energy for RPS compliance have a similar effect on markets as import rules that require an accompanying unit-specific energy delivery—but in Arizona’s case, it is constraining internal trading, not just imports. California requires RECs bundled with energy for imports but allows more flexibility in electricity delivery. Even though both states are supported by the Western Renewable Energy Generation Information System (WREGIS), their markets are smaller and less liquid than if unbundled REC trading were allowed among all WREGIS states.

The market impact of states within a control area differing in their treatment of unbundled REC trading is fairly significant because the market size is bifurcated into states that allow unbundling and states that do not. Each market is smaller than if RECs traded freely within the region. Renewable generators within the region would be more likely to sell to states with greater flexibility and would be inclined to pick and choose based on the buyer’s location, internal market transmission constraints, and prices determined by supply and demand. The more restricted market would likely be less well served than the more flexible market.

2.1.9 REC definitions

REC definitions are important because if they are too dissimilar, the RECs may not be readily fungible or interchangeable, even if the generators meet other eligibility criteria. In fact, most states define RECs differently, but the definitions fall into five categories (Holt and Wiser 2007):

- 1) A detailed definition specifying which attributes must be included, or conveyed, for purposes of RPS compliance;
- 2) A statement that the REC includes all renewable and environmental attributes, without specifying just what those attributes might be;
- 3) A statement that the REC includes all the environmental attributes;
- 4) A statement that the REC includes unspecified attributes; or
- 5) A definition that a REC represents a unit of production (attributes not mentioned).

Perhaps the most significant set of attributes affecting market functioning relates to emissions. Each RE generator has direct, on-site emissions characteristics or attributes. If the generator uses renewable resources, the direct emissions may be zero. If the emissions are zero, and the generator displaces fossil generation, an emission reduction is created. Depending on what emissions regulations are in force where the generator is located, these emissions reductions may have value in environmental markets. Because RECs may have value for both RPS compliance and emissions markets, it is important to specify exactly what is included in the RECs.

Detailed definitions help clarify what attributes must be conveyed with a REC. For example, New York defines RECs to include derived emission benefits. New York's REC definition (through the NYSERDA competitive procurements of RPS attributes) states that the attributes include "the exclusive rights to claim... that New York State and/or the RPS Program is responsible for the reductions in emissions and/or other pollution resulting from the generation of the Bid Facility's energy and its delivery into the [New York Control Area]." Arizona, California, Colorado and Washington have similar emission-inclusive definitions.

However, even if a state provides a detailed definition for a REC, the definitions vary. Pennsylvania, Delaware and North Carolina have detailed definitions, but in contrast to the previously named states they reach the opposite conclusion: derived emissions benefits or allowances are not required to be retired for compliance with the RPS.

Clearly, a REC that is eligible for Pennsylvania and Delaware would not be automatically eligible for RPS compliance in New York. If a generator in Pennsylvania or Delaware wanted to sell to NYSERDA for RPS compliance in New York, it would have to convey or retire any emission reductions it is entitled to in the sale.⁷

Trading in RECs that lack a clear and precise definition of included attributes can lead to ambiguity and uncertainty, which markets dislike. Different REC definitions, particularly with respect to the inclusion or omission of emission reduction attributes, probably mean that the RECs are not fungible, reducing market liquidity. It should be noted that certificate tracking systems do not currently record the information about emission reductions, much less track them separately from other REC attributes. Therefore, there is at present no way to know whether or not emission reductions are in fact conveyed with the sale of a REC.

This can present a problem for obligated entities that try to comply but have no way, other than an attestation, to determine whether the attributes have been traded separately.

However, some tracking systems provide certificate definitions that in effect bind system users to a harmonized definition. For example, the PJM Generation Attribute Tracking System states that renewable attributes include the environmental attributes which are defined as “any and all credits, benefits, emissions reductions, offsets, and allowances, howsoever entitled, directly Attributable to the generation from the Generating Unit(s).” WREGIS and the Midwest Renewable Energy Tracking System use a nearly identical definition. Account holders with the tracking system agree to abide by these rules and definitions. Although this provides standardization, it may not serve the needs of states that adopt a different REC policy.

2.1.10 Flexibility mechanisms (REC banking and borrowing)

Some RPS designs allow obligated entities to bank or borrow renewable energy or RECs to provide flexibility in complying with the standard. Banking is fairly common in state rules.⁸ This allows obligated entities to bank excess compliance for use in a subsequent period. For example, Massachusetts and Rhode Island allow banking for two additional compliance years, but banking is only allowed if the obligated entities have excess RECs beyond their compliance needs, and then only to the extent of 30% of their total obligation. In some states, RECs are given a multi-year shelf life that has the same effect as allowing compliance banking. Delaware, the District of Columbia and Maryland, for example, establish a REC lifetime of three years. The shelf life of a Pennsylvania REC is two years, but the REC does not start aging until the utility has purchased it.

Borrowing allows an obligated entity to be short of the necessary RECs in a compliance year by promising to make up the difference in a future year. Some states allow an obligated entity to purchase additional RECs for compliance during a true-up or reconciliation period. This may be three to six months after the close of the compliance year.

One of the reasons for banking and borrowing is to ameliorate REC price fluctuations (Chupka 2003). By banking excess RECs, the RECs are not forced onto the market when prices may be low. By borrowing RECs, compliance may be achieved at no additional cost to the obligated entity in the current year, which might make sense if a lot of RECs from a new generator were expected on the market the following year. Banking and borrowing can substantially affect market dynamics and prices, but their influence on market size and REC fungibility may be limited. Even if different states have different banking and borrowing rules, the cumulative effect in a larger regional market is to smooth supply and demand from year to year, and to ameliorate price fluctuations.

2.1.11 Cost caps and alternative compliance mechanisms

Most states include a way to limit the cost of RPS compliance. The following list outlines the various cost cap approaches employed by states (Wiser and Barbose 2008).

- 1) A cap on retail rates or utility revenue requirements

- 2) A price cap on renewable energy contracts
- 3) A per customer cost cap
- 4) A cap on how much revenue may be taken in by a renewable energy fund used to subsidize renewable energy purchases
- 5) A financial penalty for non compliance
- 6) An ACP that may be made in lieu of acquiring RECs

Within New England, RPS states are mostly coordinated in their cost control mechanism. Massachusetts, Maine, New Hampshire and Rhode Island all use an alternative compliance payment (ACP), and the first of these, Massachusetts, has indirectly influenced the others to adopt the same payment levels, currently \$57.12 per MWh. This is important because they are all sourcing RECs from the same market. If one state set its ACP lower than the rest, the REC market would be distorted as obligated entities in the other states will pay more to ensure compliance when supply is short. If REC demand in the region exceeds supply, the state with the lower ACP might be the last served—if it is served at all. It should be emphasized that this distortion would occur only when REC demand exceeds available supply, causing REC prices to float to the ACP level, and RECs to migrate to the market with the highest cap.

Unlike the states mentioned above, Connecticut, the fifth state in the region with a mandatory RPS, uses a fixed payment of \$55 per MWh as a penalty for non-compliance. Although this is not the same approach and the payment level is not identical to the ACP in other New England states, the penalty serves a similar function to the ACP, and the difference is small enough currently to have only a minor effect.

This similarity in compliance mechanisms in New England did not come about by accident. With the adoption of Maine's Class I RPS in 2007, renewable energy developers urged that the ACP match other states in the region, calling the implications of different ACPs within the same regional market of greater importance than all other policy differences.

"If a lower-than-regional [ACP] could undermine compliance and be the driving cause of delays in the scheduled RPS target increases, and if a higher-than-regional [ACP] saddles Maine with the highest burden in the region in the event of insufficient REC supply, then the only reasonable set-point for [ACPs] is in line with the other states in the regional New England market. Such a choice will also aid in price transparency and liquidity required to develop a well-functioning market that can ultimately strive to meet the RPS targets at minimum cost to ratepayers."⁹

Similar arguments were made in early 2008 when New Hampshire was adopting its RPS law.

In the Mid-Atlantic region, Delaware, the District of Columbia, Maryland, New Jersey and Pennsylvania are all part of the PJM market, but compliance fees in each state are different, sometimes significantly so. In New Jersey, the ACP may be set each year by the NJBPU, but is currently \$50 per MWh for Class I

resources, and \$300 per MWh for solar. Pennsylvania has a non-compliance penalty for Class I of \$45 per MWh, and for solar at 200% of the market price for solar. On the other end of the range, Maryland has an ACP of \$20 per MWh for Tier 1; this will become \$40 in 2011. Maryland's solar ACP is \$450 per MWh in 2008, declining to \$400 in 2009, and declining by \$5 every other year until it reaches \$50 in 2023. Delaware is in the middle of the range and uses a different approach to ACP. The initial ACP is \$25 per MWh, but having relied on the ACP in one year, a provider will face an ACP of \$50 in the next year, and then \$80 if they must resort to the ACP in a third year. Delaware's solar ACP begins at \$250 per MWh and increases to \$300 if the electricity supplier has opted for the ACP in any previous year. The ACP then increases to \$350 with subsequent uses.

These compliance payment differences may not matter if supply exceeds demand because there is less chance that obligated entities will resort to use of the ACP. However, if REC demand exceeds supply, these differences matter within a given market where renewable generators are RPS-eligible in a number of different states. In that situation, if different states within the same market rely on different types of cost caps or different levels of ACPs, then suppliers (generators or REC providers) will gravitate towards states with the more severe consequences of non-compliance because the obligated entities in those states will pay more for RECs. Furthermore, such market balkanization may lead to a lack of price transparency, which itself can be a barrier to investment, because smaller markets would mean fewer trades. Perhaps more important, smaller markets could increase the risk to RE generators of being shut out of the markets for which they are eligible, due to political decisions or because of the small market 'fills up' and prices crash. Of course, if geographic boundaries for eligible generators are enlarged, harmonization may be even more challenging because of the greater diversity of cost control options that would bring.

2.2 Assessment of Market Barriers

The above discussion of potential barriers to expanded markets for renewable energy incorporated some assessment of how markets are affected by state policy differences on each RPS design option. In this section, those impacts are assigned a simple rating of high, medium or low impact on markets, assuming that the issue pertains to a given state. If there are no differences among states in a region on the particular issue, then the impact would be rated as low.

This assessment is based on the analysis above and the review by members of the Northeast/Mid-Atlantic RPS collaborative, informed by the author's judgment, and supplemented by informal interviews with a few load serving entities and RE generators that are active in multi-state markets. The assessment is intended to apply to any RPS state—it is generic and is not intended to reflect conditions in any specific group of states.

Any assessment of high, medium or low impacts is obviously not quantitative, but these ratings are based on the relative degree of the negative effect of the respective RPS policy difference on market size (volume of trading), market liquidity (number of sellers and buyers), REC fungibility, and price transparency. The results are summarized in Table 3.

Table 3. Assessment of Impacts

Eligibility	Impact Assessment
<ul style="list-style-type: none"> • Definition of resource eligibility, including multi-fuel facilities • Generator vintage requirements • Eligibility and definition of incremental renewable generation • Treatment of customer-sited facilities • Geographic area of generator eligibility and requirements for energy delivery to ISO 	<ul style="list-style-type: none"> • High • Medium • Low or medium • Low or medium • High
Structure	
<ul style="list-style-type: none"> • Single tiers or multiple tiers • Credit multipliers 	<ul style="list-style-type: none"> • Medium • Low
Administration	
<ul style="list-style-type: none"> • Compliance mechanism: RECs or no RECs • REC definition of environmental attributes • Flexibility mechanisms (REC banking, borrowing) • Cost caps and alternative compliance payments 	<ul style="list-style-type: none"> • Medium • Medium • Low • Medium or high

As a qualitative assessment, these ratings are intended only to suggest where states might concentrate their efforts towards increasing harmonization. In the next section, we look at possible steps that states could take towards harmonization in each area.

3. STRATEGIES TO INCREASE HARMONIZATION

The options described in this section require, as a prerequisite, that states determine that increased harmonization is desirable and produces meaningful market and cost benefits. As discussed in Section 1, some states may prefer to contain or control their RE markets. This review, especially the assessment of advantages and disadvantages, is based on the premise that REC fungibility, increased competition, broader markets and price transparency are beneficial from a public policy perspective, and outweigh the potential loss of some local economic and environmental benefits associated with in-state market protection.

Several recent studies of electricity markets have demonstrated the benefits of larger markets. For example, one study stated that a larger number of market participants and trading volume are important indicators of market liquidity. “A broader diversity of market participants dilutes market power opportunities and increases the universe of natural sellers and buyers as well as market makers.” (ESAI 2007). Another study, assessing the expansion of PJM, concluded that the benefits of broader markets include increased trade, more diversity of supply, increased price transparency, better opportunities to hedge risks, increased liquidity, reduced transaction costs, and cost savings to wholesale customers and retail consumers (Krapels and Flemming 2005).

Even if states acknowledge these benefits, however, it must be recognized that most of these options would be politically challenging and could involve some trade-offs with realizing more local, in-state objectives. The challenges to obtaining multi-state consensus on implementing these harmonization opportunities, and achieving regulatory or legislative approval, should not be underestimated.¹⁰ It should be noted, however, that increased harmonization is not an “all or nothing” proposition. Increasing coordination among just a handful of states in a region and on just one or two policy issues can lead to stronger RE markets and demonstrate the merits of such harmonization to other jurisdictions.

Platform for considering harmonization

There are several means by which harmonization of RPS policies could be pursued. The first option is for the regional RPS Collaborative (the group for which this paper was undertaken) to pursue multi-state agreements to advance harmonization. In 2006, Clean Energy States Alliance (CESA) and Clean Energy Group (CEG) established a regional RPS Implementation Collaborative of RPS program administrators from the Northeast and Mid-Atlantic states. The Collaborative’s members are sharing information about what is working in different states to advance RPS success; conducting data sharing and joint analysis; and facilitating regional cooperation.

Beginning in 2008, CESA and CEG also initiated a national State-Federal RPS Collaborative. The primary purpose of the State-Federal RPS Collaborative is to establish a national dialogue and collaborative among state policy leaders, the U.S. Department of Energy, and other major RPS stakeholders to share information and examine opportunities for multi-state and federal cooperation in successful deployment of RPS programs.

Either of these collaboratives could provide a forum for advancing RPS harmonization among states.¹¹

A third possible platform is available through the Environmental Tracking Network of North America (ETNNA).¹² Its purpose is to create a forum for the coordination and cooperation of systems issuing and tracking certificates of generation in North America.

ETNNA is a voluntary association of certificate tracking systems, regulators and interested market participants that are vested in preventing double-counting and promoting harmonization among certificate tracking systems in North America. Such harmonization will encourage trade, create a common currency for certificates of generation, prevent double counting, and support new and emerging markets. Although ETNNA’s focus is on tracking system operation, many of the harmonization issues it intends to address are similar to those facing state RPS administrators.

A final process model that could be considered for states to pursue RPS harmonization is the Regional Greenhouse Gas Initiative (RGGI).¹³ Recently, states in the Northeast and Mid-Atlantic regions agreed to a memorandum of understanding, and hammered out a model rule to reduce carbon emissions from the power sector. Most of the ten states that are now participating in RGGI required enabling legislation to implement the MOU and carbon reduction program, and all of them are implementing the program

through adoption of state-specific implementing regulations. Although states have tried to conform their programs to the model rule, the process allows for some individual state tailoring, and accommodates broad stakeholder comment through the legislative and rule-making processes. As applied to the issue of RPS harmonization, this type of approach would require a more formal commitment from each state's Governor or senior energy officials to develop and commit to advancing model RPS policies and rules, and a commitment to seek approval from their state legislature or regulators for the specific RPS policy changes developed by multi-state consensus that would increase RPS harmonization in the region.

Potential Effect of a National RPS

Efforts to harmonize RPS designs or rules across multiple states could be overshadowed by the adoption of a national RPS. At a minimum, such a national RPS development in the near future would at least distract from this effort, and it is likely that it could undermine the importance of regional cooperation altogether.

3.1 Eligibility: resource, vintage and incremental generation

The first three design options described in Section 2 above are treated together in this section because the opportunities for harmonization are similar.

Option 1: Revise eligibility criteria

A group of interested states would agree to pursue a voluntary process to achieve greater standardization of definitions of eligible resources, generator vintage, and treatment of incremental generation. It would probably make the most sense initially to include just states that are served by a common electricity market, although other states might be invited to participate or observe. The members of the Northeast and Mid-Atlantic RPS Collaborative have already developed draft model rules on resource eligibility, included as Appendix B.

To acknowledge the different resources and political realities of different states, this effort may want to focus only on the top class of renewable resources (sometimes referred to as Class I), ignoring the greater variety of resources supported by some states in other secondary categories.¹⁴ Another rationale for narrowing the focus in this way is that Class I standards typically encourage the development of new resources to which increased market liquidity and price transparency are more important for financing.

Advantages of the Option 1 Approach:

- Renewable energy and RECs become more fungible within the region
- Creates a wider market
- Decreases the potential for price separation among similar policies within a region
- May create additional pricing transparency given greater trading
- Lowers compliance costs

Disadvantages of the Option 1 Approach:

- Politically challenging to pursue and no assurance of success
- Legislative action probably required
- Success in harmonization may require states to place less emphasis on certain state-specific objectives, such as fostering local economic development
- Changes to RPS rules, or even the risk of such changes, could create market instability
- Process may be administratively burdensome, consuming significant staff time, although as noted a model rule for resource eligibility has already been created by the Northeast and Mid-Atlantic states

Option 2: Accept Class I generation eligible in another state

If the broad, multi-state process described in Option 1 is viewed as too burdensome, states could negotiate reciprocity agreements among themselves. Accommodating the various differences in eligibility definitions, states would agree to accept Class I generation or RECs from each other for the good of new RE development in general. Such agreements would preferably be multilateral to create larger markets, though bilateral agreements might be an easier first step if only two states can be found that agree on the benefits.

It may seem unlikely that states would accept generation that does not meet their specific eligibility criteria, but if compliance prices are high and the political pressure on the RPS programs is significant, this approach might be worth considering. On the other hand, reducing compliance prices can also be detrimental to new investment.

Advantages of the Option 2 Approach:

- May be quicker to achieve than actually revising and harmonizing eligibility criteria
- Reduces pressure on RPS compliance cost
- Certificates become more fungible within region
- Creates a wider market

Disadvantages of the Option 2 Approach:

- Lower prices reduce support for new renewable development
- May require states to place less emphasis on certain state-specific concerns
- Politically challenging to pursue and no assurance of success
- Legislative action probably required

Option 3: Discount generation from other states

This option is similar to Option 2 except that states would accept other state generation at a pre-determined discount instead of at par. As described by Berendt (2006), states would agree to recognize certain RECs eligible in other states on a reciprocal basis. Participating states would negotiate the value of the other state's RECs for compliance with the first state's RPS.

This negotiation is not based on the fact that a RE generator may be certified for compliance in a given state even though it is located out of state. Instead, the negotiation is a matter of accepting RECs from generators that otherwise would not meet a state's eligibility criteria, due to differences in resource or vintage eligibility rules.

The result would be a schedule of conversion factors, posted by each participating state, which would be applied to RE generation or RECs within that state's RPS program. For example, a hydropower plant eligible in Maine but ineligible in Connecticut because its capacity exceeds 5 MW might be accepted for compliance in Connecticut at a discount of 0.7. Fuel cells using non-renewable fuels that are eligible in Connecticut but not in Maine might be accepted in Maine at a different discount under a reciprocal agreement. Similarly, New Jersey, with a generator vintage requirement of 2003 or later, might accept, at a discount, energy or RECs eligible for Delaware's RPS with a vintage of 2000.

In negotiating these conversion factors or discounts, states might consider the degree of difference from a model rule or from their current resource and vintage eligibility definitions, and the degree to which the discounted criterion might contribute to in-state economic or environmental benefits.

Advantages of the Option 3 Approach:

- Certificates become more fungible within region
- Creates a wider market
- May be quicker to achieve than actually revising and harmonizing eligibility criteria
- Provides more flexibility for affected RE generators
- Allows states to give preference to eligible resources while expanding options for compliance
- Reduces pressure on RPS compliance costs

Disadvantages of the Option 3 Approach:

- Politically challenging to pursue and no assurance of success
- Lower prices reduce support for new renewable development
- Negotiation among states may be challenging
- Difficulty of setting conversion factor schedule

- Legislative action probably required
- Undermines harmonization of alternative compliance payment levels (see Section 3.9), since REC values will vary depending on discount rules

3.2 Customer-sited facilities

Variations in the treatment of customer-sited RE facilities include differences eligible criteria (resource type, vintage, size), geographic location, and measurement and verification. Possible ways to deal with eligibility criteria are described above, and geographic eligibility is discussed below. The assessment here is confined to measurement and verification (M&V), and only one option is presented.

Option 1: Seek multi-state consensus on measurement and verification

Working through the national and regional RPS collaboratives and Clean Energy States Alliance, states would develop a model M&V protocol that each would endeavor to adopt.

M&V is also an issue for tracking systems, which have their own requirements for issuing certificates to small RE generation. The NEPOOL GIS, for example, has adopted independent third party verification requirements. Further, the North American Association of Issuing Bodies, now incorporated ETNNA, developed a best practices document for behind the meter generators (NAAIB 2006). As an example, ETNNA's recommendations include the following:

- Generators that do not go through a control area settlements process should use a revenue-quality meter that meets the applicable ANSI C-12 standard.
- Generators less than 10 kW, however, may use engineering calculations to estimate generation output, but a standard estimation method is recommended. In addition, an independent verifier should spot-check these estimates.
- Generators 5 MW or larger should telemeter generation data to the control area operator or utility settlement system, or may use an independent third party to report their generation data to the tracking system operator.
- Generators under 5 MW may telemeter data, use a third party or self-report their generation to the tracking system operator, but the reporting protocol should be disclosed in the certificate data.

States could start by reviewing each state's M&V requirements and points of difference, as well as tracking system requirements and the NAAIB/ETNNA document. States might also choose to include ETNNA or individual tracking system representatives in this discussion.

Advantages of the Option 1 Approach:

- Relatively uncomplicated and straightforward step to begin advancing increased coordination among state RPS policies
- Some groundwork already performed by ETNNA

- Increases market size and market access for customer-sited generators

Disadvantages of the Option 1 Approach:

- The amount of MWhs generated by customer-sited systems is small relative to utility-scale generation used for satisfying RPS requirements
- Not a very big effect in terms of broadening RE markets
- Changes in M&V requirements would in many cases require rulemaking with public comment

3.3 Geographic eligibility and energy delivery requirements

Typically, RPS legislation or regulation defines where RE generators must be sited to be compliance-eligible. This is usually within the region (where region is defined as coincident with an electricity control area, Independent System Operator or Regional Transmission Organization) or in an adjacent region that allows electricity to be imported to the region in which the RPS state is located.¹⁵

For customer-sited generation, sometimes the same geographic rules apply, and sometimes the customer-sited generation must be located in-state for eligibility. It is unlikely that customer-sited generation located in an adjacent region would attempt to be used for compliance in another region because the generating facility would be too small to schedule over transmission lines, and all the transaction costs would probably be too expensive for the small quantity of energy involved.¹⁶

There are several options described below for broadening geographic eligibility, but none of them are easily achievable because geographic eligibility is directly linked to the relative priority of state RPS policies to support and encourage “local” (or at least regional) economic development.

Option 1: Standardize geographic eligibility and energy delivery

Within a region, states could agree to use the same geographic eligibility and energy delivery requirements and energy delivery. States within the region could compare their requirements for generator location and for energy delivery and adopt a common approach.

For example, most of New England states are similar in their treatment of geographic and energy delivery requirements, with a few exceptions. Connecticut, Massachusetts, New Hampshire and Rhode Island allow RE generators in adjacent control areas to be eligible, as long as energy is delivered into the region, whereas Maine allows generators anywhere outside the region as long as energy is delivered into the region. The rules for energy delivery have been similar, but Massachusetts, as a result of recent legislation, may soon impose new limitations on generation not located in ISO-NE by requiring an annual capacity commitment from imports and by offsetting other exports against renewables imports.

In states in the western U.S., it might be difficult to describe the region, because although there is a common tracking system, there is no single electricity market. Perhaps because of this, several western states require energy delivery to the state or to the obligated entity. Nevada requires energy delivery over

a direct transmission inter tie between the generator and the state. Colorado encourages, but does not require, in-state generation and has no restriction on the location of RECs creation.

Advantages of the Option 1 Approach: Standardizing geographic and energy delivery rules would

- Simplify trade within the greater region
- Reduce the cost and complexity of access to RE generators outside the region
- Could lead to larger and more liquid markets
- Provide more flexibility for RPS compliance at less cost

Disadvantages of the Option 1 Approach:

- May result in states adopting the strictest eligibility requirements, which would reduce market size
- May reduce environmental and economic development benefits if standardization leads to relaxing current requirements
- May be politically difficult for states to agree
- Legislative action probably required

Option 2: Broaden facility geographic eligibility

Broadening geographic eligibility could entail a range of options, depending on the different states' current eligibility rules. For example, states that already have similar geographic eligibility, such as regional or adjacent region location requirements, could broaden eligibility to locations anywhere in the United States—or even broader to include free-trade countries.

In the interest of broadening markets, however, perhaps the most reasonable and effective measure would be to allow eligibility to any generator located in the ISO serving the state, or any ISO serving the state in cases where a state is served by more than one. This is already the case in New England, New York, and the Mid-Atlantic states, where there is general consistency for facility eligibility. This approach works well in New England and the PJM states, because multiple states are served by common electricity markets.

RPS states in these eastern regions already accept RECs from facilities in adjacent control areas if energy is also delivered into their own electricity market. If these states wish to broaden markets further, they could consider pursuing a reciprocity agreement among RPS states served by PJM, New York and NEPOOL to accept RECs from facilities in any of these control areas without energy delivery (see Option 3).

In pursuing broader eligibility, the states could consider creating a price floor for in-region RECs. This would protect in-region generators that might otherwise be out-competed based on price.

In contrast to the Northeast and Mid-Atlantic regions, many areas of the country are not served by an ISO or integrated regional electricity markets. Instead there are sometimes numerous small control areas. In many cases, a control area operated by a utility is simply not sufficient to support a strong REC market. To enlarge RE markets, RPS states in this situation could consider naming adjacent control areas or states where eligible facilities may be located. States could require energy delivery to their state or more broadly to any of the named control areas or states.

States with in-state requirements for customer-sited RE generation could similarly broaden eligibility to include RE generators located in other states within the same control area.¹⁷ Massachusetts, for example, recently implemented this change.

Advantages of the Option 2 Approach:

- Provides more flexibility for RPS compliance at less cost
- Could lead to larger and more liquid markets
- Could be supported by price floors to encourage in-region RE generation

Disadvantages of the Option 2 Approach:

- Politically difficult to achieve unless supply is very tight and not expected to grow significantly
- May reduce environmental and economic development benefits for states with low to modest renewable resource potential, while increasing benefits for other states with high potential
- If market size is expanded quickly, resulting lower prices could undercut investments made in expectation of high prices
- Legislative action probably required

Option 3: Relax energy delivery requirements

Most states that accept RE generation located in an adjacent region nevertheless require that energy be delivered from the adjacent region into the region serving the state. To address this, states could consider relaxing energy delivery requirements. Under this concept, generators located in adjacent regions would not be required to deliver energy into the region serving the state. The RECs from those generators in adjacent regions, however, would still count towards the state RPS. The receiving state would accept unbundled RECs from specified adjacent areas.

Though politically challenging, this could break down barriers to the use of unbundled RECs throughout the country. The North Carolina RPS provides an example of a state that allows unbundled RECs from anywhere outside the state, but subject to the limitation that use of out-of-state unbundled RECs is restricted to 25% of required compliance. The remainder of the RPS requirement must be met using in-state RE generation or generation with energy delivered to the obligated entity.

Another approach that states may wish to explore is the approach used by the Colorado RPS. It imposes no restriction on the location of eligible generation or RECs creation, but it encourages in-state generation by the use of a credit multiplier. Eligible electricity generated in Colorado receives 125% credit for RPS-compliance purposes.

A less drastic relaxation of energy delivery requirements would be to address the requirement in many states (and tracking systems) for hourly matching of generation and energy delivery as the basis for importing RECs from an adjacent region. Although ISOs would still need energy imports to be scheduled hourly, and to ensure transmission system reservations, state RPS rules (and certificate tracking system rules) could allow certificates to be accepted if they match the number of MWh delivered into the region serving the state over the period of a month or a quarter, allowing for a true-up within the regular cycle used by tracking systems to create certificates. Thus, instead of issuing imported certificates based on the lesser of scheduled energy deliveries and actual deliveries within each hour, the tracking system would issue certificates only for the number of MWh imported during the monthly or quarterly issuing period. Rules could allow delivery from the specific renewable generating unit at any time within the certificate issuing period of the importing tracking system, or, as in California, they could allow an energy import from another source as long as the amount of energy and the number of RECs produced from the two facilities match within the issuing period.

Relaxing energy delivery requirements could also be used in conjunction with Option 2, broadening geographic eligibility. For more discussion of these approaches, see Grace and Wiser (2002).

Advantages of the Option 3 Approach:

- Provides more flexibility for RPS compliance at less cost
- Could lead to larger and more liquid markets
- Greenhouse gas emission reductions, even if created outside the region, would still be beneficial to the importing state because the greenhouse effect is global and adversely affects all states.

Disadvantages of the Option 3 Approach:

- Politically difficult to achieve unless supply is very tight and not expected to grow significantly
- If market size is expanded quickly, the resulting lower prices could undercut investments made in expectation of high prices
- Additional energy would have to be imported to displace more environmentally damaging plants in region to create some of the desired environmental benefits, yet it might result in re-labeling transactions that would occur anyway
- Legislative action probably required

Option 4: Use geographic eligibility as a flexibility mechanism

Under this option, states would expand geographic eligibility (Option 2) or relax energy delivery requirements (Option 3), but only if certain limited supply conditions are demonstrated. For example, expanded geographic eligibility could be triggered if ACPs are used for 50% or more of the requirement (in aggregate, not for just one obligated entity) for three years in a row. For states that do not provide for ACPs or penalties, the threshold could be RPS non-compliance for 50% or more of the requirement for three years in a row. The numbers 50% and three years are used for illustration purposes only—the higher the threshold, the less likely geographic eligibility would be expanded.

This approach is somewhat analogous to the Regional Greenhouse Gas Initiative rule that allows a specified percent of carbon offsets to be used for compliance in lieu of emission allowances if the price of carbon allowances exceeds a certain threshold, and the percent allowed rises if a higher threshold is exceeded.

This approach is also somewhat similar to the Illinois RPS approach to geographic eligibility. The Illinois RPS requires the use of in-state RE resources unless there is insufficient eligible generation that is cost-effective. It then specifies resources from adjoining states, again unless there are insufficient, cost-effective resources, and then allows generation from other regions. After 2011, equal preference is to be given to resources located in-state and in adjoining states.

Advantages of the Option 4 Approach:

- Provides more flexibility for RPS compliance at less cost
- Could lead to larger and more liquid markets
- Might be more feasible to achieve than simply expanding geographic eligibility or removing energy delivery requirements across the board because the supply trigger set-points are known and the rationale is agreed upon in advance

Disadvantages of the Option 4 Approach:

- Somewhat complicated and uncertain whether it will have any effect
- Might be subject to gaming, in which obligated entities purposefully do not comply because they hope to be granted the flexibility and access to (potentially) cheaper energy supply or unbundled RECs
- Legislative action probably required

3.4 RPS structure

Many states have established separate portfolio requirements for specific RE resource categories, such as tiers, classes and resource set-asides. Further, some states support renewables through multiple policy mechanisms, including planning grants, financial incentives and long-term contracts, as well as the RPS.

This variation in RE support policies makes it difficult to harmonize state approaches to create a robust, truly balanced regional market between states with multiple RE supports and states that rely just on an RPS.

It also is not easy to harmonize the fundamental structure of RPS design across states when it is almost always established in legislation in response to various stakeholders and interest groups. It is difficult to revise a legislative-established RPS foundation based on state specific objectives and a state's unique political process. Harmonization, however, if it is to be pursued successfully, must be focused on the foundation itself.

Option 1: Standardize resource categories

States would seek to develop a model RPS policy design with standardized technology categories and structure. States would have to agree on the basic eligible resource categories, including such categories or classes as solar, other renewables, eligibility date for new resources, alternative (non-renewable) energy, energy efficiency. Then each state would adopt requirements for those particular, standardized resource categories that they wish to support. For example, states might adopt only one or two of the categories, or all of them, but whatever categories they adopt would be defined in the same way. Thus, the solar technology group would be the same, other renewables would be the same, new renewables would be the same, etc.

Because such a sweeping overhaul of existing RPS policies would create losers whose eligibility might be swept away (unless eligibility goes to the lowest common denominator), states could agree to grandfather affected generators, with the grandfathered generation being treated as eligible throughout all states in a market.

Advantages of the Option 1 Approach:

- Renewable energy and RECs become more fungible within the region
- Creates a wider market
- May lower prices because of increased competition within each category
- May create additional pricing transparency given greater trade within category

Disadvantages of the Option 1 Approach:

- Politically challenging to pursue and no assurance of success
- Legislative action probably required
- Changes to RPS rules, or even the risk of such changes, will create market instability
- Would risk creating losers, and this constituency would strongly oppose the changes
- Process may be administratively burdensome, consuming significant staff time

3.5 Credit multipliers

Credit multipliers for preferred resources may distort REC markets in a region if RECs are in short supply. In that case, RECs may gravitate to states with the multipliers. As noted previously, the effect of credit multipliers can depend on the presence and level of an ACP in neighboring states. The effect on markets may be modest, except to the extent that supply (MWh generated) is reduced relative to the targets because of the existence of the multipliers.

Option 1: Limit credit multipliers to in-state resources

If credit multipliers were limited only to in-state generation, RECs from these eligible facilities would be likely to be used for RPS compliance in-state.

Advantages of the Option 1 Approach:

- Limits market distortion of REC gravitation away from other states towards the state with the credit multiplier

Disadvantages of the Option 1 Approach:

- Restricts the market size for a resource favored with a multiplier in exchange for a potentially small market benefit
- Supply is marginally lower than it would have been
- Legislative action probably required
- Changes to RPS rules, or even the risk of such changes, will create market instability

Option 2: Standardize credit multipliers within market region

States within a region would agree on whether to offer credit multipliers, what RE resources would be subject to multipliers, and the size of the multipliers.

Advantages of the Option 1 Approach:

- Removes any market distortion by eliminating incentive for REC gravitation or different prices
- Creates a wider market
- May lower prices because of increased competition within each multiplier category
- May create additional pricing transparency given greater trade within category

Disadvantages of the Option 1 Approach:

- Politically challenging to pursue and no assurance of success
- Benefits are modest—significant market distortion from differing multipliers is unlikely unless demand exceeds supply

- Legislative action probably required
- Changes to RPS rules, or even the risk of such changes, will create market instability
- Process may be administratively burdensome, consuming significant staff time

3.6 Compliance mechanism: RECs or no RECs

As described in Section 2.1.7, most states (especially in the Northeast) already allow unbundled RECs within a region to be used for RPS compliance. For those few states that do not allow RECs to be traded separately from electricity, it is a binary choice: either they allow RECs to be traded or they do not. Of course, states often allow REC trading while at the same time imposing RPS requirements that constrain REC use. For example, a state may allow unbundled REC trading within the state only if the electricity is generated within the state or, if the RE generator is out of state, after it is delivered into the state. In effect, that state is allowing use of RECs, but placing a geographic constraint on their origin.

Since most states already allow RECs for RPS compliance, the following options describe what could be done to facilitate greater trade and price discovery.

Option 1: Require greater REC price transparency

Currently, REC price information generally comes from two sources: trades reported by REC brokers and the degree to which obligated entities use alternative compliance payments. Broker reporting, in fact, has been very important to analysts and regulators trying to understand REC markets. Brokered deals, however, cover only a portion of the market. By definition, they do not include bilateral deals struck without their assistance, and generally do not include long-term contracts.

To get a bigger REC price picture, states could require that obligated entities report to the regulatory agency prices paid for RECs. A few states do this now. Maryland and the District of Columbia require electricity suppliers to report the price paid for RECs used for compliance, and Pennsylvania requires the RPS administrator to report the average cost of compliance. Other states that regulate the obligated entities typically allow utilities to recover costs of compliance; this would require that costs be reported at some point. If this information were required to be publicized in a timely way, it would be useful to advancing market competition.

Prices for each REC transaction, of course, are sensitive, proprietary information, so regulators might require that each entity report not each transaction, but rather the total volume and cost for each month or for each quarter. To further protect confidentiality, regulators could then aggregate reports from all entities and publish average prices for the period. This would enable market participants to determine more easily price trends, and REC prices would likely become more competitive.

Advantages of the Option 1 Approach:

- Price trends are more evident to regulators and to market participants

- Offered prices and bids would tend to be more competitive
- May support development of forward price curves, essential to project finance
- Likely to require only administrative changes

Disadvantages of the Option 1 Approach:

- Resistance by obligated entities, developers and generators to reporting requirements, despite confidentiality protections
- Average price data would not be indicative of 'spot' market prices and could distort price signals if obligated entities use a combination of spot and longer-term contracts, or a combination of bundled and unbundled purchases
- Concerns that transparent price reporting may actually increase renewable energy prices when renewable energy demand exceeds supply

Option 2: Encourage a common REC trading platform

Most states that allow RECs have designated or established REC tracking systems as an efficient way to avoid double-counting by tracking the issuance and ownership of RECs. However, states have not established a REC trading platform. Generally states leave it to the trading parties to find each other and strike deals, either on their own or with the assistance of brokers.

Trading RECs in a central exchange or a trading floor would help reveal prices, create a price index that could be tracked, and develop future price curves. For example, the Green Exchange was created in early 2008 by the New York Mercantile Exchange (NYMEX) and Evolution Markets, an environmental products and energy brokerage.²¹ The Exchange is currently trading EU carbon credits as well as U.S. NO_x and SO₂ emission allowances. A news report states that the Green Exchange will begin trading renewable energy credits and voluntary carbon credits later in 2008.

Since central exchanges are competitive ventures and require a lot of volume to be profitable, it is unlikely that small regional exchanges would be viable, but states could encourage reliance on exchange trading to help provide greater price transparency.²² For an exchange to be liquid, greater harmonization of RPS policies may be prerequisites (see especially Sections 3.1, 3.2, 3.3, 3.6, and 3.7).

Advantages of the Option 2 Approach:

- Price trends are more evident to regulators and to market participants
- Offered prices and bids would tend to be more competitive
- May support development of forward price curves, which are essential to project finance

Disadvantages of the Option 2 Approach:

- Volume of each type of REC (by state, by class) may be insufficient to justify creating and maintaining the exchange
- To reach volume, states may need to pursue greater harmonization of eligibility criteria, REC definitions, among other policy options
- Advancing establishment of an exchange may not be perceived as being an appropriate state role

3.7 REC definitions

State REC definitions vary considerably, and theoretically this can make it difficult to sell them interchangeably from one state to another. Tracking systems serving these diverse states, however, standardize all the information about various attributes specified by the most demanding state REC definition.

Thus, although a state may define a REC as simply a unit equivalent to a MWh, the RECs issued by the tracking system will include information about resource type, vintage, geographic location, etc. because this information is important to other states, and indeed it may be important even to the state with the minimal REC definition.

REC definitions are especially important when it comes to attributes that have a market value if sold separately from the REC itself. In particular, there are markets for emission reductions. A RE plant that is entitled to an emissions reduction credit or allowance could sell that attribute separately from the REC and still use the REC for RPS compliance if the state where the REC is used does not include that emissions attribute in its REC definition.

As described in Section 2.1.9, most states have not addressed whether a REC used for RPS compliance purposes must include any available emission reduction credits or allowances, and this leads directly to the first harmonization option for consideration.

Option 1: Define whether emission reduction credits or allowances must be retired for RPS compliance

Regardless of whether or not a state decides to include emission reduction credits or allowances in a REC definition, states could address the definitional question in rulemaking and remove any ambiguity about what is expected for compliance. States can look to the examples from Arizona, California, Colorado, New York and Washington (emission attributes required for compliance), or from Delaware, North Carolina and Pennsylvania (not required).

Advantages of the Option 1 Approach:

- Removes uncertainty in the market whether a REC must convey specified attributes
- Not particularly difficult to do since each state determines its own preference
- Likely to require only administrative changes

Disadvantages of the Option 1 Approach:

- Administrative rulemaking cost (but could be included with other RPS clarifications)
- Merely defining whether specific attributes must be conveyed with a REC provides no benefits in terms of harmonization and broader markets, unless most states agree on a standard definition (see Option 2).

Option 2: Standardize to a model REC definition

States would work together to try to reach consensus on a model definition for RECs and the attributes that are part of a REC. As with standardizing resource eligibility criteria, it may make most sense initially to focus discussion among states within a common electricity market, because that is where most REC trading occurs. However, a national conversation would also be useful. States would discuss and evaluate what is the best practice for a REC definition, adopt a model rule, and pledge to work to advance adoption of the rule across states.

Most states (and tracking systems) do not disaggregate the individual attributes of a REC. This may be a starting point for a harmonization discussion. In fact, most states are silent as to whether emission reduction credits or allowances must be retired for RPS compliance (Holt and Wiser 2007). In resolving this question, states would need to consider whether they expect the RPS to reduce emissions (implying that credits or allowances must be retired for compliance, if the RE generators are entitled to them), or whether they expect the RPS to reduce the cost of compliance with the emission reduction program (implying that emission credits or allowances need not be retired). It should be noted that under a cap-and-trade program, RE generators may not be entitled to emission credits or allowances, and in the absence of a cap-and-trade program, there may be less market pressure to split off the emission reduction attribute.

The Regional Greenhouse Gas Initiative (RGGI) again provides an example of a framework and process for states to develop an agreement on REC definitions. States also could participate in the Clean Energy Group national State-Federal RPS Collaborative to further such a definition.

Advantages of the Option 2 Approach:

- Renewable energy and RECs become more fungible within region
- Creates wider, more competitive REC markets
- Reduces current ambiguity on what a REC includes

Disadvantages of the Option 2 Approach:

- Politically challenging to pursue and no assurance of success
- Process may be administratively burdensome, consuming significant staff time

3.8 Flexibility mechanisms (REC banking and borrowing)

REC banking and borrowing are intended to provide obligated entities flexibility if RECs are plentiful or scarce, respectively. Banking and borrowing can also smooth out REC price fluctuations. Despite these benefits, the presence or absence of these flexibility mechanisms in RPS states may have little effect on larger and more liquid REC markets. Nevertheless, “banking/borrowing” harmonization across states may make it easier for obligated entities to manage their REC accounts, especially if they face RPS obligations in more than one state with different rules.

Option 1: Standardize banking and borrowing across states

States would work together to consider best practices for banking and borrowing (including a standardized REC lifespan), adopt a model rule or practice, and pledge to try to adopt it in rules. This could be one of several items on a harmonization agenda through the CEG national RPS Collaborative. It would be easier (and more effective) if done within a regional REC market, however. Also, it may be easier to accomplish for banking than for borrowing, as borrowing has less support in state RPS programs and has greater potential to distort the market and allow for scofflaws.

Advantages of the Option 1 Approach:

- May be easier than some other options because there is less parochial interest riding on this design option
- May have only a modest effect on wider, more competitive REC markets

Disadvantages of the Option 1 Approach:

- May be a low priority because it will have modest effect on expanding markets
- May require legislative changes for something that provides a modest benefit

3.9 Cost caps and alternative compliance payments

If different states within the same market rely on different types of cost caps or different ACP levels, suppliers (generators or REC providers) will gravitate towards states with the more severe consequences of non-compliance. When RE demand exceed available supply, the RPS in states with higher cost caps will be satisfied first. The RPS in states with lower cost caps may not be satisfied and obligated entities may be forced to rely more frequently on the capping mechanism. States that think they are getting off cheaply because of their lower cost cap will actually find that their policies are less likely to motivate new investment in RE generation.

Harmonized cost cap mechanisms, with the cost of compliance the same or nearly so across states and regions, will avoid distorting the market response to different RPS requirements and will provide a more effective signal for investment in new renewables.

Option 1: Standardize cost caps within market region

To harmonize cost control mechanisms and ACP levels would require that RPS states within a region

would work towards a consensus on the preferred mechanism and cost control levels. States would first have to agree on the approach—financial penalty or ACP.²³ Then they would have to agree to eliminate or narrow differences between the cost control levels. For example, if reliance on an ACP is the preferred mechanism, the actual level of the ACP would have to be agreed among RPS states in the renewable supply region.

As with resource eligibility, it might be helpful to focus first on the top class of renewable resources (sometimes referred to as Class I), because other classes of resources generally have a greater variety of eligible resources, which could force different cost caps. Also, because these Class I resources tend to encourage the development of new renewables, harmonization may be more important to send a clearer price signal for financing new projects.

Advantages of the Option 1 Approach:

- Reduces market distortion
- Avoids market balkanization
- Creates more liquid and competitive REC markets, and results in improved price transparency
- Provides greater certainty for project investment decisions
- Might be achieved through administrative actions alone

Disadvantages of the Option 1 Approach:

- States have to be informed and realize that their RPS goals would be more effectively met if they adopt similar cost caps
- Politically challenging to pursue
- Process may be time-consuming of administrative resources

3.10 Summary

Table 4 summarizes the options discussed for harmonizing state RPS policies to benefit from the creation of larger markets. Table 4 lists each option for harmonization, and for each option, it shows the estimated benefit to expanded, more liquid markets and the political difficulty of accomplishing the change in policy. The assessments shown in Table 4 are merely the author's judgment and are certainly arguable.

Table 4. Assessment of Policy Change Options

Topic / Option	Description	Benefit to Markets	Political Difficulty
3.1	Eligibility: resource, vintage and incremental generation		
Option 1	Revise eligibility criteria	Medium	High
Option 2	Accept Class I generation eligible in another state	High	High
Option 3	Discount Class I generation from other states	Medium	High
3.2	Customer-sited facilities		
Option 1	Seek multi-state consensus on measurement and verification	Low	Low
3.3	Geographic eligibility		
Option 1	Standardize geographic eligibility and energy delivery	Medium	Medium
Option 2	Broaden facility geographic eligibility	High	High
Option 3	Relax energy delivery requirements	High	High
Option 4	Use geographic eligibility as a flexibility mechanism	Medium	Medium
3.4	RPS structure		
Option 1	Standardize resource categories	Medium	High
3.5	Credit multipliers		
Option 1	Limit credit multipliers to in-state resources	Low	Low-Med.
Option 2	Standardize credit multipliers within market region	Low	Medium
3.6	Compliance mechanism: RECs or no RECs		
Option 1	Require greater REC price transparency	Medium	Low-Med.
Option 2	Encourage a common REC trading platform	Medium	Low-Med.
3.7	REC definitions		
Option 1	Define whether emission reduction attributes are required	Medium	Low
Option 2	Standardize to a model REC definition	High	Medium
3.8	Flexibility mechanisms (REC banking and borrowing)		
Option 1	Standardize banking and borrowing across states	Low	Medium
3.9	Cost caps and Alternative Compliance Payments		
Option 1	Standardize cost caps within market region	High	High

4. CONCLUSIONS

As this report indicates, there are excellent opportunities to increase coordination and greater uniformity between state RPS policies and thereby broaden renewable energy markets. The various policy options that would have the greatest impact on creating larger, more competitive markets, however, tend to be politically difficult to accomplish because they require significant changes in policy and may run counter to individual state interests. There are relatively few policy adjustments that would be easy to accomplish. Further, those options that may be judged as easier to achieve tend to have less impact on creating larger markets, although they may offer other administrative benefits.

If states are convinced that the benefits of increased RPS harmonization and uniformity are worth pursuing, it is recommended that they start by making their own assessment of the relative benefits and challenges of each option in Table 4 before deciding which areas to target for action. If states wish to address options with potentially big market effects, they might start by examining RPS eligibility criteria, geographic eligibility, and cost caps and ACPs. On the other hand, if states are inclined to start with easier steps first, in order to demonstrate early success and confirm a spirit of cooperation, they could consider standardizing M&V protocols for customer-sited generation, credit multipliers, and REC banking and borrowing rules.

The State-Federal RPS Collaborative (managed by Clean Energy Group and Clean Energy States Alliance) is well-positioned to consider these options as a group because its members consist of a broad cross section of state RPS program administrators. To move forward, the State-Federal RPS Collaborative could agree first on the priority “harmonization” issues that it will address, and the rationale for tackling these issues.

To the extent that some issues selected for state cooperation can be addressed through an administrative rule-making process, then greater harmonization may be readily achievable. In many instances, however, legislative changes will be required to achieve bigger and more competitive markets. Seeking legislative approval for a collaborative approach will require significant political commitment from high levels of state government, similar to the RGGI initiative.

Finally, regardless of whether states with an existing RPS choose to pursue increased harmonization and regional market development, states considering the adoption of new RPS laws, or developing new RPS rules, would be well advised to consider the effects of the design of their policies on larger markets. In designing an RPS program, states should give particular attention to the existing RPS policies of their neighbors in their electricity region. Attention to these details prior to RPS adoption could make a state’s entry into RPS markets smoother and less costly.

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Appendix A: Northeast and Mid-Atlantic RPS Collaborative Members

Connecticut Clean Energy Fund
Connecticut Office of Policy and Management
Connecticut Department of Public Utility Control
Delaware Public Service Commission
District of Columbia Public Service Commission
Maine Public Utilities Commission
Maryland Energy Administration
Maryland Public Service Commission
Massachusetts Department of Energy Resources
Massachusetts Renewable Energy Trust
New Jersey Board of Public Utilities
New Jersey Department of Environmental Protection
New York Department of Public Service
New York State Energy Research and Development Authority
Pennsylvania Department of Environmental Protection—Office of Energy
and Technology Deployment
Pennsylvania Public Utility Commission
TRF Sustainable Development Fund—Pennsylvania
U.S. Environmental Protection Agency
Vermont Public Service Board

Observers: California Energy Commission, Illinois Clean Energy Community Foundation, Ohio Department of Development, Honeywell, CSG, National Conference of State Legislatures, Exeter Associates, Vermont Energy Investment Corp., PJM-Environmental Services, Renew Wisconsin, and Lawrence Berkeley National Lab

Appendix B: Model Resource Eligibility Definitions

MODEL RESOURCE ELIGIBILITY DEFINITIONS

Northeast and Mid-Atlantic States Collaborative on RPS Implementation— Model Resource Eligibility Definitions

States have multiple policy objectives for enacting renewable portfolio standards (RPS) and these objectives often vary from state to state. States are interested in taking advantage of some or all of the various benefits associated with renewable energy, such as obtaining environmental benefits, improving resource diversity, advancing technologies, promoting in-state economic development, and responding to public support for renewable energy.

Each of these objectives, however, can inform different definitions of renewable resources that are eligible for the RPS. In designing an RPS, policymakers seek to match their goals with the characteristics of the different renewable resources. As a result, there is substantial variation between state RPS programs in the definitions of eligible resources.

While there is no single, ideal way to define eligible RPS resources, there is merit in establishing some clear, common definitions of renewable resources for states to consider as RPS programs evolve and mature. To that end, the members of the Northeast and Mid-Atlantic States Collaborative on RPS Implementation have developed a set of model resource eligibility definitions. In developing these definitions, members took into consideration each state's current definitions as a starting point; selected definitions where there was substantial commonality between states already; crafted new definitions when warranted that are clear, specific, and consistent with the major RPS policy objectives of the states; and considered special issues associated with specific technologies and fuels (i.e. unique characteristics of hydropower and biomass).

The following recommended model definitions are based on the experience of RPS administrators participating in the Northeast and Mid-Atlantic States Collaborative. They are based on identification of best practice design elements and broad policy design principles. These standard definitions can be productively used to guide successful RPS policy design both at the states and federal level. However, designing an effective RPS often requires balancing sometimes-conflicting goals. Therefore, while these recommended definitions can guide state RPS definitions, considering policy trade-offs will remain important.

There are several reasons why common RPS eligibility definitions have merit for consideration by policymakers at the state and federal levels.

First, these definitions can assist state policymakers as they develop new, or amended, RPS policies so that they include clear, well-crafted definitions of resource eligibility.

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Second, use of common definitions by states serves the overriding goal of an RPS—to advance renewable energy resources in the most efficient and low cost manner possible. Today, variations in state specific definitions of renewable energy or REC eligibility tend to segment renewable energy markets across the region and the nation. This results in smaller, less liquid markets that can increase the cost of RPS compliance by limiting the types and sources of renewable energy that can be used to meet compliance. A common definition of renewable resources would allow states to more readily integrate their markets and increase the liquidity of RECs.

Third, the recommended common definitions are designed to allow states to avoid vague and unclear terms when crafting eligible resource definitions. In order to support investment in renewable facilities, developers need to know with certainty whether or not a facility will qualify before making significant financial commitments and must have confidence that definitions are sufficiently clear so that the universe of possible competitors is known. Developers and investors also are more likely to pursue new renewable projects if there are multiple state market outlets for the project output.

Fourth, the use of common and clear definitions will reduce administrative complexities and costs by avoiding debates over sometimes vague resource eligibility definitions. It will help to free regulators from the burden of holding time-consuming regulatory proceedings to determine whether a particular facility qualifies towards an RPS mandate.

Finally, use of common definitions by states will allow for the development of RPS reciprocity between states, i.e. a renewable energy generator that registers in one state RPS would automatically be eligible in other states with RPS policies. Reciprocity will help ease RPS administration; make it easier for renewable energy generators to register for multiple states' RPS policies; and thereby help contribute to a larger, more regional market for renewable energy generation.

For these reasons, the following definitions are crafted to provide a common RPS eligibility foundation while providing flexibility to allow for technology advancement and development. The definitions are technology and fuel inclusive and attempt to avoid discrimination against any one renewable resource. The definitions also are crafted to minimize the need for policy-makers to determine the forms of technology that should receive market preference or to continuously revise the mandate to include new technologies that may be developed.

Energy vs. Electricity: Each definition begins with the phrase “Electricity derived from...” because, unless specified by a state as electricity generation, renewable resources can mean energy from eligible resources that have not been converted to electricity. Such energy, for example, could come from geothermal heat pumps, solar water heating systems, biomass used as a heat-

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ing fuel, and landfill gas that is upgraded and supplied in a gas pipeline.

Because most existing state RPS policies seek to achieve increases in the quantity of renewable resources in the portfolio of a retail electricity seller, the recommended definitions restrict eligibility to resources and technologies that generate electricity. While some states include energy efficiency resources in their RPS, the model common definitions are focused on renewable energy electricity generation. This approach provides consistency and ensures that each resource definition is geared towards electricity production, rather than avoided consumption.

On the following pages is a suggested model definition of each renewable energy resource and the rationale for the definition.²⁴

Resource

Wind

Definition

Electricity derived from wind energy.

Rationale

Existing state definitions vary from the very generic—"wind"—to the more specific—"wind turbines," and include other variations without policy significance, such as "wind power," "wind energy," and "electricity derived from wind energy." The concept of wind power is universal and simple as defined by the states. The recommended fuel-based wind standard, "electricity derived from wind energy" is specific, inclusive of all wind-based electricity-production technologies, consistent with or implied in the various existing state "wind" definitions, and does not conflict with respective state policies or affect differing political realities. States could adopt the proposed definition with no significant alteration in the meaning of how any specific state defines wind-based electricity as an eligible resource in their RPS.

Resource

Solar

Definition

Electricity derived from solar energy.

Rationale

All states include solar power in their RPS policies. However, the definitions vary greatly, with some states not specifying any particular form of solar technology and other states listing

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specific eligible solar technologies. Existing definitions range from the very generic “solar” to the very specific “radiant energy, direct, diffuse, or reflected, received from the sun at wavelengths suitable for conversion into thermal, chemical, or electrical energy.” Some states list solar technologies and photovoltaic technologies as two separate fuel sources.

The recommended definition of “electricity derived from solar energy” is specific, universal, and inclusive of all solar-based technologies that create electricity using a technology that employs solar radiation. It includes photovoltaics and solar thermal electric technologies. The inclusive definition is not significantly different from what is included, or implied, in the majority of state solar-based definitions (except for those few states that limit eligibility to PV or states that include solar thermal energy).

The recommended model definition also provides a broad fuel-based definition that affords states the flexibility to incorporate new solar electric technologies as they are developed without requiring legislative or regulatory changes.

Resource

Fuel Cells

Definition

Electricity derived from any electrochemical device that converts chemical energy in a hydrogen-rich fuel directly into electricity without combustion.

Rationale

Currently, there is little consensus among state RPS policies regarding whether certain kinds of fuel cells powered by natural gas and other “non-renewable” fuels should be included in the definition of technologies eligible for RPS compliance purposes. Only a few states qualify fuel cells as eligible technologies without imposing renewable fuel requirements.

In contrast, the majority of states include only fuel cells that operate on renewable fuel in their RPS as eligible resources.

The disparity of approaches by states regarding fuel cell eligibility is limiting the ability of RPS policies to promote fuel cell technology advancements. Because fuel cells represent an advanced energy technology that is vital to the transition to a clean energy future, the recommended definition includes fuel cells as eligible RPS resources, regardless of fuel source. This “technology-based” definition would allow fuel cells to participate in RPS markets, irrespective of fuel source. The definition encourages the use of the technology, rather than a specific fuel, with the intent

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of helping fuel cells to “compete” with other technologies in RPS compliance.

From a policy perspective, the definition is based on the recognition that, with their low emissions profile and advanced energy character, fuel cells are important for environmental and climate reasons and their potential to act as a zero-emissions technology.

The recommended definition also is consistent with the major policy goals that states are trying to achieve through an RPS, including technology advancement, environmental benefits, in-state generation, distributed generation, and resource diversity.

Resource

Geothermal

Definition

Electricity derived from geothermal sources.

Rationale

Most states include geothermal fuel resources in their RPS. While the definition of geothermal power varies among states, the different definitions are fairly broad, have no major policy significance and are not mutually exclusive. For example, some states do not define geothermal power while others use particular phrases in reference to this type of power, such as “steam turbine,” “hot water or steam,” “earth’s crust,” or “heat of the earth.” Since the definitions are all very similar and often identical in meaning, states could adopt the proposed definition with no significant alteration in the scope of eligibility under current state-specific definitions.

The recommended geothermal power definition is inclusive and is consistent with the major state RPS policy objectives—obtaining environmental benefits, advancing renewable energy technologies, and promoting energy diversity.

Resource

Oceans, Lakes and Rivers

Definition

Electricity derived from the tidal currents, thermal gradients and waves of oceans, lakes or rivers.

Rationale

Ocean-based technologies are eligible under several state RPS policies. However, most of the states with ocean-based resource eligibility do not clearly specify the three types of ocean-

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based technologies that might be eligible: tidal current, wave, and ocean thermal. For the most part, the various definitions used by states are general in nature and are not intended to restrict specific forms of ocean energy.

No state lists tidal currents, thermal gradients, and waves in lakes and rivers as eligible resources. Many of the aforementioned technologies will operate in all bodies of water. The recommended ocean/lake/river definition is intended to be inclusive of all the types of ocean, lake, and river-based energy technologies, with the exception of hydropower. Broadening the definition to include all three technology applications in oceans, lakes and rivers provides states with the flexibility to take advantage of these new, evolving technologies in all viable water-based locations. The definition also makes this resource category relevant to all states, allowing even non-coastal states to receive the in-state benefits of multi-state RPS support for wave, current and thermal energy.

Resource

Biomass

Definition

Electricity produced by the direct combustion or co-firing of solid, liquid and gaseous fuels derived from organic, non-fossil materials, not to include:

- a) Construction and demolition waste;*
- b) Black liquor from pulp and paper mills;*
- c) Mixed municipal solid waste;*
- d) Old-growth timber.*

Also included is methane from the anaerobic decomposition of organic materials from sources such as:

- a) Landfills;*
- b) Wastewater treatment;*
- c) Agricultural operations;*
- d) Sewage treatment facilities;*
- e) Food and beverage processing, sales or distribution facilities.*

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Eligible biomass fuels may be co-fired, or blended, with fossil fuels, provided that only the renewable energy fraction of production from multi-fuel facilities shall be considered eligible. The facilities must meet or exceed current federal or state air emission standards, whichever is more stringent. Biomass facilities must meet the emission limits of the state whose market it is selling into, rather than just the state that it is operating in, unless the emissions regulations in the operating state are more stringent.

Rationale

The term “biomass” is very general and can be interpreted to include a wide variety of resources, such as primary biomass resources (whole trees and crops grown for energy purposes), forest and agricultural wastes, urban wood wastes, municipal solid waste, landfill gas, and black liquor (a by-product of pulp and paper production). Methods of converting biomass to electricity also vary and include direct combustion, co-firing with coal, gasification, anaerobic digestion, and pyrolysis. Each of these technologies has varying emission rates and energy conversion efficiencies. As a result, the various state RPS definitions for biomass eligibility exhibit a high degree of complexity, variation, and ambiguity.

There are a number of policy-based restrictions placed on the eligibility of biomass involving such factors as air quality, a desire to support new biomass projects, and concern over the potential over-harvesting of forests and overuse of farm lands for energy crops. Furthermore, the use by some states of terms such as “non-hazardous,” “sustainable” and “low-emission” introduces substantial uncertainty over which biomass fuels and facilities do and do not qualify. For example, there is no generally agreed upon standard to ensure sustainable biomass harvest and cultivation. Regardless of the policy rationale, these eligibility restrictions can make it difficult for biomass energy projects to benefit from RPS policies.

Therefore, crafting a standard biomass RPS-eligibility definition which allows for adding more biomass capacity and addresses the range of state biomass restrictions poses a significant challenge. Faced with this challenge, the recommended definition does not use descriptive restrictions such as “non-hazardous,” “sustainable” and “low-emission” because these terms do not have commonly accepted definitions, only introduce ambiguity, and are difficult to enforce.

Instead, the recommended biomass definition excludes those specific biomass resources that many states have excluded on policy grounds due to environmental concerns—black liquor, construction waste and mixed municipal solid waste. The exclusions also include old growth forests because of the significant sustainability problem facing this resource and recognized public interest value in maintaining the remaining old growth forest.

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The proposed biomass definition also includes a broad, inclusive category for methane gas resources—including landfills, sewage and wastewater treatment facilities, food and beverage wastes, and wastes from agricultural operations, including animal and crop wastes. This reflects the strong merits of this renewable resource and its consistency with state environmental, local generation, climate change and fuel diversity goals. Of particular importance, methane-based facilities significantly reduce emissions that contribute to climate change. Methane is a potent greenhouse gas, with a heat-trapping capacity of about 21 times that of carbon dioxide. An inclusive definition of methane gas resources does not raise any air emission, public health, hazardous substance, or sustainability issues of consequence (as compared to other biomass resources discussed above).

The model definition further addresses the eligibility of mixed-fuel facilities (co-firing), such as coal facilities that also burn biomass fuels. The definition allows only the energy generated from the qualifying biomass fuels to benefit under an RPS. Rather than ban the eligibility of such facilities altogether, the definition allows for efficient combinations of fuel usage while providing benefits for the use of biomass-based eligible fuels.

Finally, to address air quality concerns, rather than using a qualitative term such as “low-emission,” the model definition refers more specifically to emission rates as specifically defined by the state which is receiving out-of-state-generation, or the federal EPA standard, whichever is more protective of human health and the environment. This acknowledges the regional nature of air pollution and respects the legitimate efforts of states to protect their air quality.

Resource

Hydropower

Definition

Electricity generated by a hydroelectric facility that:

- a) operates as a run-of-river* facility, or has been repowered without the use of new impoundments,*
- b) has a maximum design capacity of 30 megawatts or less,*
- c) uses flowing water as the primary energy resource, with or without a dam structure or other means of regulating water flow,*
- d) is not located at a facility that uses mechanical or electrical energy to pump water into a storage facility, and*

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e) meets all relevant environmental standards as determined by the state environment department.

** “Run-of-river” refers to a hydropower facility that releases water at the same rate as the natural flow of the river—outflow equals inflow.*

Rationale

The unique characteristics of hydropower, such as its technological maturity and extensive development, many states have restricted the RPS eligibility of hydropower. Taking these characteristics into account, the proposed definition incorporates the most common elements of state definitions on hydropower eligibility. The definition allows for RPS economic support for small-scale hydropower facilities that have operational characteristics designed to address the major environmental concerns associated with hydropower dam operation—damage to watersheds and fisheries.

The recommended definition avoids the use of vague terms and restrictions such as requiring certification as a “low-impact” hydropower facility, which would require a time-consuming case-by-case review for environmental acceptability. Instead, the definition relies on compliance with established state environmental standards to ensure that RPS-supported hydropower projects are environmentally acceptable.

The most significant feature of the recommended definition is that it is designed only to support small-scale hydropower, by establishing an eligibility ceiling of 30 MW or less of aggregate capacity. This capacity cap was selected because it is the most common limit used by states. The small hydro eligibility focus also is designed to provide financial support to those projects that are likely to be less economically stable. Furthermore, the small-scale hydro focus is designed to avoid the environmental drawbacks associated with larger hydropower facilities with impoundments, as compared to smaller dams that operate under run-of river conditions.

Finally, the definition establishes RPS eligibility for incremental hydropower repowering at existing small-scale hydro sites to provide support to additional generation achieved through increased efficiency or use of new equipment that will further a state’s technology advancement goals.

ENDNOTES

- 1 On the other hand, states with lower cost renewable resources (for example, a good wind resource) could see their costs increase as their lower cost generation is sold to neighboring buyers.
- 2 Sometimes the rules themselves are vague, leading to potential loopholes that could allow large quantities of incremental generation resulting from refurbishments, replacements, or efficiency improvements to become eligible. This ambiguity is potentially very destabilizing, and discourages investment.
- 3 Some states credit the output of off-grid facilities, while others do not. Harmonizing rules to accept off-grid generation would be beneficial to the owners of such systems but would not have much impact on the size and competitiveness of certificate markets.
- 4 Recent Massachusetts legislation has introduced additional requirements that must be considered, further complicating geographic eligibility.
- 5 A credit multiplier allows the obligated entity to count each eligible REC as one times the multiplier. Just as some favored technologies may receive extra credit, in-state generation may receive extra credit (in Colorado's case, 1.25 for each MWh generated in-state). Tracking systems do not issue multiple certificates for each MWh, but a state with a credit-multiplier policy counts each eligible certificate as worth more for compliance purposes.
- 6 Legislation recently adopted in Massachusetts requires out-of-region generators to provide a capacity commitment and energy netting of exports, if determined by the Department of Energy Resources to be feasible. These requirements will further restrict geographic eligibility, beyond simply requiring the import of energy into the region.
- 7 Whether this would have any price implications would depend on whether the generator has other options to sell emissions reductions separately from the REC.
- 8 In New England and in PJM, the certificate tracking systems require that certificates be retired (with exceptions) at the end of the year. Consequently, it is the excess compliance (not the actual REC) that is banked. Only obligated entities may bank excess compliance.
- 9 Maine PUC Docket No. 2007-391 (Chapter 311, Portfolio Requirements Rulemaking), Comments of Horizon Wind Energy, Iberdrola Renewable Energies USA, Noble Environmental Power, and UPC Wind Management. September 27, 2007.
- 10 Although it is understood why renewable energy is required to be built within a specific region, other energy resources are not similarly constrained by regulation. Traditional energy resource procurement is typically based on least-cost criteria with some recognition of environmental costs.
- 11 See <http://www.cleanenergystates.org/jointprojects.html>.
- 12 This non-profit was recently incorporated after operating for several years as a program called the North American Association of Issuing Bodies. See <http://www.resource-solutions.org/policy/etnna/>
- 13 See <http://www.rggi.org>.
- 14 Many states refer to the group of new renewable resources as Class I or Tier 1, while existing resources (older generators) or non-renewable generators are labeled Class II, III or IV.
- 15 See Wisner and Barbose (2008) for a table summarizing state geographic eligibility rules.
- 16 There are a few exceptions: for example, large customer-sited generation associated with paper mills. If the generation is used on site, it would not be sold in the wholesale market.
- 17 Many states offer financial incentives for the installation of customer-sited systems within the state, making it politically challenging to allow the RECs from those systems go out of state.
- 18 Obligated entities with fewer than 150,000 customers are not limited in the amount of out-of-state RECs they may use to meet the standard.
- 19 This credit multiplier was part of the ballot initiative that was voted into law. In the first year of compliance (2007), most of the non-solar compliance is from in-state wind and hydro except for a small share of out-of-state wind that one utility already had under contract. The solar requirement was partially satisfied by a purchase of RECs from out of state because the utilities did not yet have their in-state solar projects up and running. Some observers feel that the political preference for in-state resources is a stronger motivator than the 125% credit multiplier (Mignogna 2008).
- 20 Even in these states, RECs are often purchased by businesses and organizations for voluntary purposes, but here the discussion is restricted to RECs used for RPS compliance.
- 21 See <http://www.greenfutures.com>. It is regulated by the U.S. Commodities Future Trading Commission.
- 22 The role this encouragement might take requires further thought, since the private sector will generally create one or more exchanges without outside stimulation once markets are sufficiently large and liquid.
- 23 Standardizing cost control to a percentage cap on retail rate increases, or a fixed dollar cap per customer, would not result in harmonized markets because it is the REC price that matters.
- 24 These recommendations do not address other eligibility issues such as whether existing renewable facilities should be included, should generators be required to meet location requirements, should states establish resource tiers, etc.



CLEAN ENERGY. LET'S MAKE MORE.

Clean Energy States Alliance (CESA) is a national nonprofit coalition of state clean energy funds and programs working together to develop and promote clean energy technologies and markets. CESA provides information sharing, technical assistance services and a collaborative network for its members by coordinating multi-state efforts, leveraging funding for projects and research, and assisting members with program development and evaluation.

Many states across the U.S. have established public benefit funds to support the deployment and commercialization of clean energy technologies. Eighteen states make up the core base of CESA membership. Though these clean energy funds, states are investing hundreds of millions of public dollars each year to stimulate the technology innovation process, moving wind, solar, biomass, and hydrogen technologies out of the laboratory and toward wider use and application in business, residential, agricultural, community and industrial settings. State clean energy funds are pioneering new investment models and demonstrating leadership to create practical clean energy solutions for the 21st century.

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